Rewriting the *Elements* of Euclid

Why would anyone want to rewrite the *Elements* of Euclid? Many authors have taken portions or the whole thing in an attempt to translate or rewrite it, many believing that they have the understanding to do a better job of it, which is hardly ever the case.

There is a biological imperative, a factual reason to rewrite the *Elements* of Euclid. A mind is one of the life support systems of the body; as such it has a biologically defined job to perform and physically determined means of doing that job. In short, a mind is designed because of the biological imperative of a living organism, to have life, and to have it more abundantly.

The purpose of mind is the acquisition of experience and the recursion of those experiences, i.e. what we have learnt, in order to maintain and promote our life. A mind does its job by information management using binary recursion.

Binary recursion is produced in four distinct manners which produce four distinct systems of grammar called a Grammar Matrix which consists of: Common Grammar, Arithmetic, Algebra and Geometry.

Geometry is the only analog grammar of the four. It is used to train the mind so that it learns the meaning of its own behavior and how to use that behavior to do the biologically defined job of a mind. Geometry is the Master Key to learning behavior, from grammar systems to every behavior of an individual.

There is not one correct grammar book on our planet at this time in human history, therefore, I am simply doing my biologically defined job, I am simply performing in accordance with a very provable biological imperative. We either grow a brain, or we die.

The following pages example my progress to date.

Section 1. Objects and Methods-Common Grammar

Contents

Common Grammar

The two elements of a grammar, or one can say the binary expression of a grammar, consists of its symbol set and a method used to recursively apply those symbols to construct names and effect memory management. We are building mapping systems in memory in order to map our behavior from the past, present, and future.

Every grammar starts with an absolute symbol set, yet the method of constructing those symbols may be either absolute or relative. Geometry is the only absolute method of producing a symbol set for a grammar and an absolute method of denoting relatives, while the remaining three, Common Grammar, Arithmetic and Algebra use relative motions of the hand to produce those

symbols while the relative differences are not displayed by the grammar at all, they are established by social customs with a weak intention to standardize them in dictionaries. The relative differences for logical systems must be preserved in some manner independent of the grammar. The overall name for the preservation of association between name and named is called a dictionary. Dictionaries are designed to maintain a parallel between the perceptible and the intelligible through the names grammar systems produce.

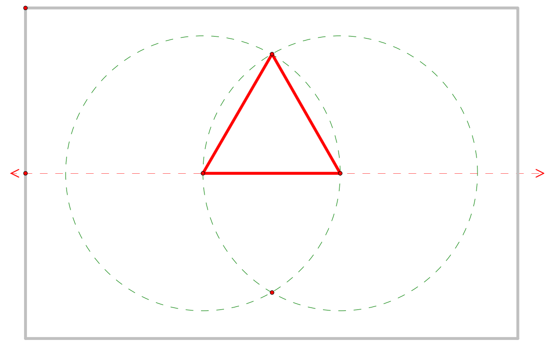
Common grammar also has a relative method of indexing those symbols to produce names which are either available to speech or not. Thus, in order to use Common Grammar, the standards of name assignment to all the things we experience has to be preserved in some manner which is still in the early stages of development for mankind through such agencies of standards of weights and measures, and even the pathetically poor attempt made by organizations for standards of nomenclature.

In demonstrating a Grammar Matrix, our first concern is using the grammar systems among themselves to parallel and standardize our nomenclature and as geometry provides the only one-to-one or arithmetic association between symbol and the intelligible binary, it is the grammar we use to pair all of our grammar systems to for proofing, not the relative names, but the relative differences by which they can and cannot be used. In short, we name a thing as an analog, name it by each of our matrix grammars, Common Grammar, Arithmetic and Algebra.

The alphabet of Geometry is a line and a compass which are actually tools which provide us with loci or choices. When we make a choice, we construct some one thing. For example, the compass guides our hand with loci available from the length of that straightedge and we decide what a segment is by writing it starting from one point and stopping at another. We have chosen our segment. We can now recursively repeat that segment using the compass to aid us. In short, we decide on a segment, the grammar shows us what may and may not be done with it.

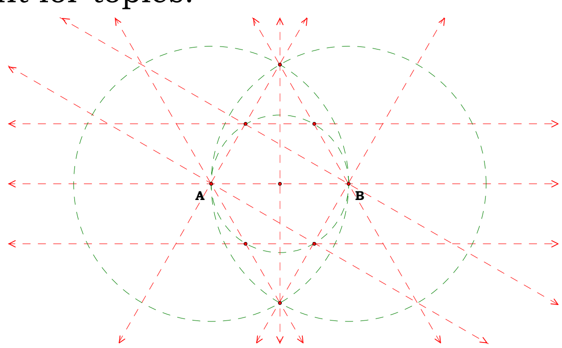
Standards in Naming

Our straightedge allows us to determine the unit, while our compass allows us to describe the universe of discourse through recursion with that unit and we can do it from both ends of our given unit or thing.



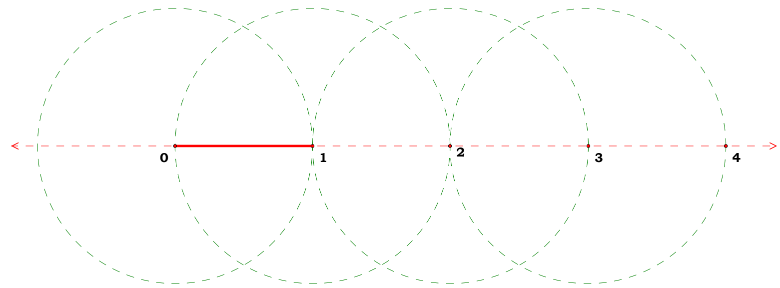
In common grammar we call the above analog in thick red an equilateral triangle. In arithmetic and algebra we parse it as 1, 2, 3, and ABC.

The elements that we have today start with little more than the above, while the definitions come before this as if one pulled a bunch of names out of their tush. And those no smarter spent over two thousand years tripping over it instead of fixing it. The figure, the unit and the universes of discourse set what we name, the standards for constructing things derivatives, short cuts alterations and standards by which results are judged. So, instead of tossing a name out, describing something from our memory and expecting everyone else to share in those memories as if everyone is Clair Buoyant, we should do it right. This first type of recursion thus provides with our object library and standards for judgment for topics.



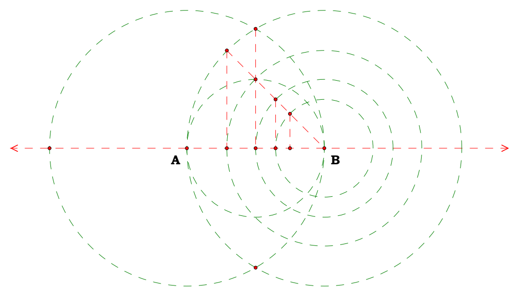
One will notice that every time we describe what can be described, more opportunities arise to filling the unit figure in, in fact, one can take this all the way through Book 1 with many topics which were not included.

We can take recursion in an altogether other direction such as:

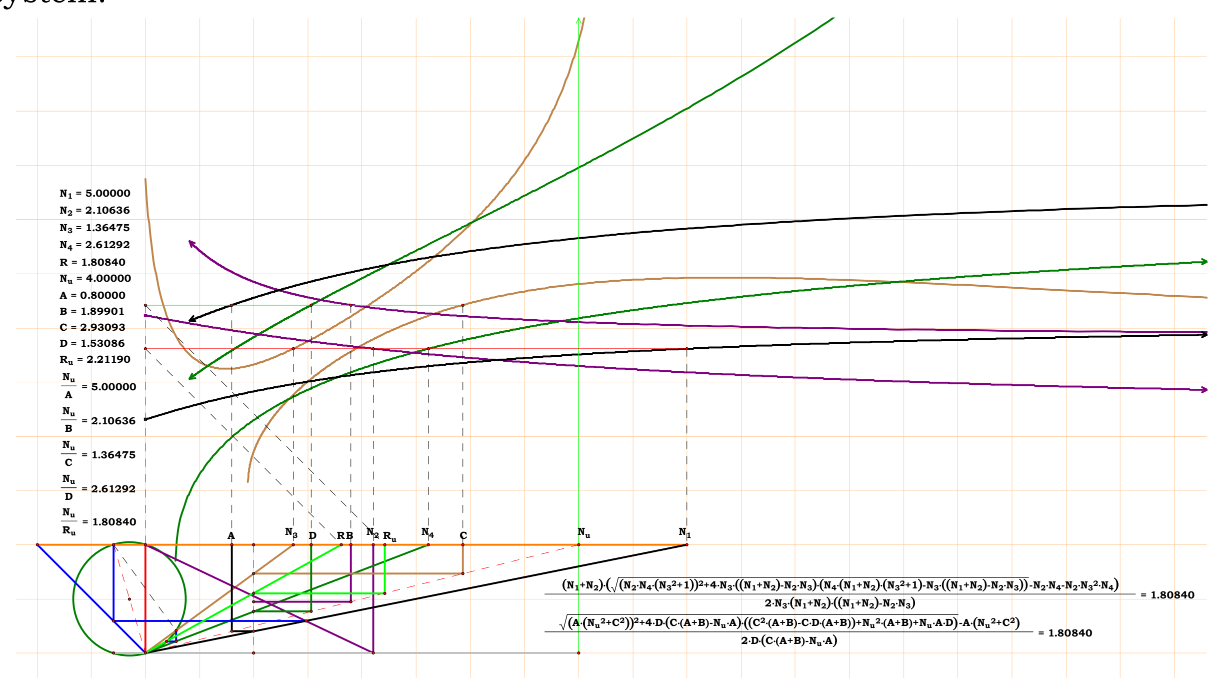


This second type of recursion then provides with arithmetic progression and arithmetic identity and equality.

This next type of recursion affords us Geometric progressions, identity and equality.



And now, if we add everything together, we get a complete Analog Grammar system.



One can project all their wave forms directly; do all the math, and logical operators.

So, we have our unit, each method of recursion applied to it determines a section of the geometry. Each method of recursion and their final sum will produce a geometry which is quite frankly, completely comprehensive.

When, comprehending all of this, my suspicions of the *Elements* being in a very, very, very early stage of development before the author of it probably died, leaving no heirs, seems almost certain. I do not believe that anyone with any sense would have left it intentionally in such a state.

Naming conventions derived from base objects given by the application of recursion, methods of standardizing those names so that any example can be judged by it, division into books based on the method of recursion used.

NOTE:

Definition is of the intelligible before it can ever be of the perceptible. For the intelligible, there is only one definition, that of a thing which is binary. In the intelligible there is only one thing. We parallel, by recursion, that definition in for every particular thing only through naming that thing's two elements, and recursively until we have mapped all of its particular units. This means that the names of relative differences are arithmetical, we name each relative difference used. While the ratio's that they are used is variable.

Each particular system of grammar is a method of utilizing binary counting.

Topical Divisions: Gross

Section 1. Objects and Methods Common Grammar.

Common grammar is completely relative. Then, one notices that a naming convention can be constructed for things of the same kind. One learns to count.

Section 2. Arithmetic Progression.

After one has been counting for awhile, one starts noticing patterns in numeric names, and then one notices that these patterns are independent of the arithmetic method of standardizing names and so, Algebra is born.

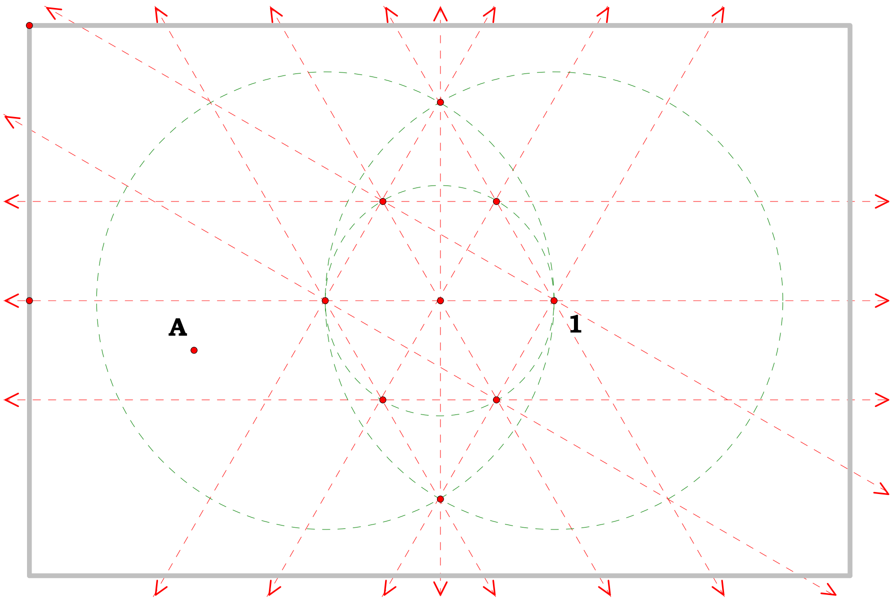
Section 3. Geometric Progression.

After we have played with algebra for awhile, and have been drawing along the way, we start to notice that all of our grammar systems are founded on simple binary recursion.

Section 4. Analog Grammar.

Is founded on the fact that our grammar systems form a grammar matrix using Geometry as a paradigm for all of our systems of grammar and we can finally make our first correct grammar book.

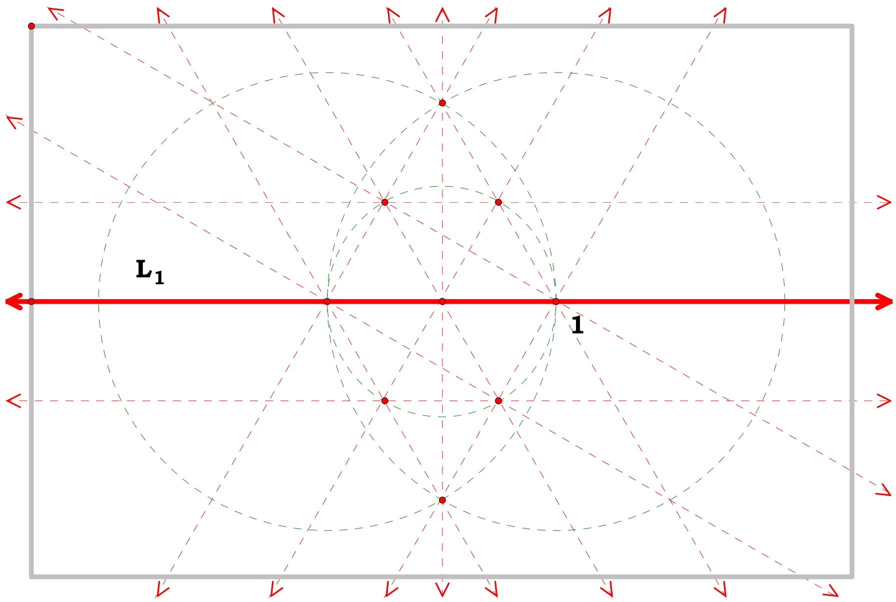
Definition 1



A is called a ***point***, a *limit*, a *boundary*, a *noun*, a *container*, *off*, a *stop*, an *extreme*, an *end*, *cut*, *divisor*, *separator*, *correlative*, etc., which we **APPLY** to write our grammar.

The degree to which a student can produce the unit in a fuller flowering, depends upon the student, their tools, and available instruction.

Line



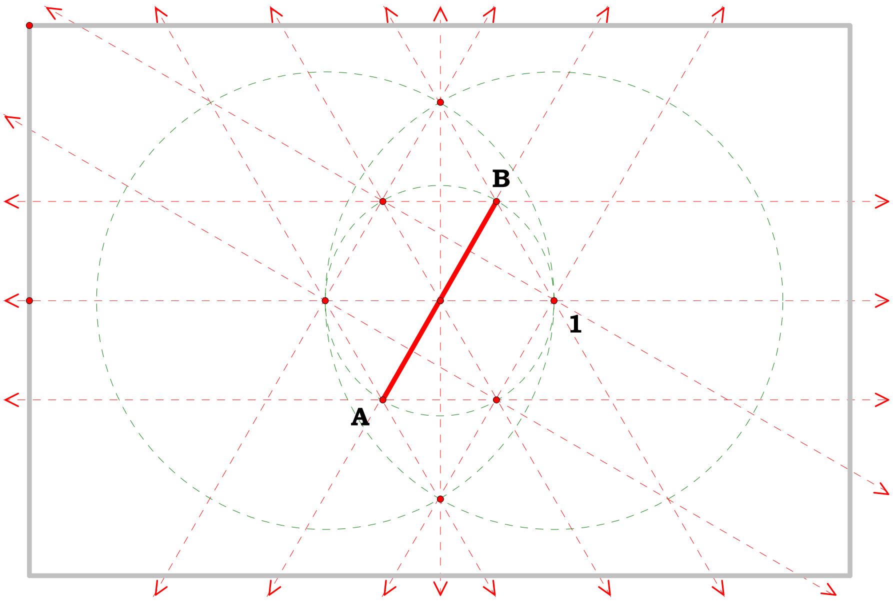
L_1 is ***linear*** which is a verb, a *relative*, a *material difference*, *difference between*, a *behavior*, a *power*, a *verb*, etc. As an element of a thing, it cannot be predicated of, it is simply not a thing, but only an element of a thing. Predicates are the names of the two elements of a thing, thus, there is no such thing as a predicate of a predicate.

However, we call L_1 a line because we produce a segment which we do not give a name to, or as a variable such as x or something, from which we carve out the things we are making just like a carpenter cuts things out of undisclosed dimensions of wood. An infinite line is simply a tautology and one might say, a bit of naïve illiteracy. We can even call a line a segment which we simply do not name, or name it by asserting a named segment with it. However, line is the method we denote linear variables with while segment a named, a defined, segment.

The intelligible concept line with the unintelligible reality of linearity is confused by many as to mean that the one which is real with the other which is cannot even be predicated of as being some form of existence; one is a method of building a system of coordination of body and mind called Coordination and Coordinates which are complementary terms in a grammar, while the other is simply gibberish. The construction of names for the perceptible and unintelligible does not mean we are predicating anything about the physical attributes of the universe. We are building a memory management system.

Every grammar assumes a base level of intelligence in regard to names. Thus, it is assumed that one is not a complete idiot and can produce a thing of one, and only one relative difference. Many PhD holders pride themselves as firmly possessing this stupidity and they would not part with it for the world.

Segment

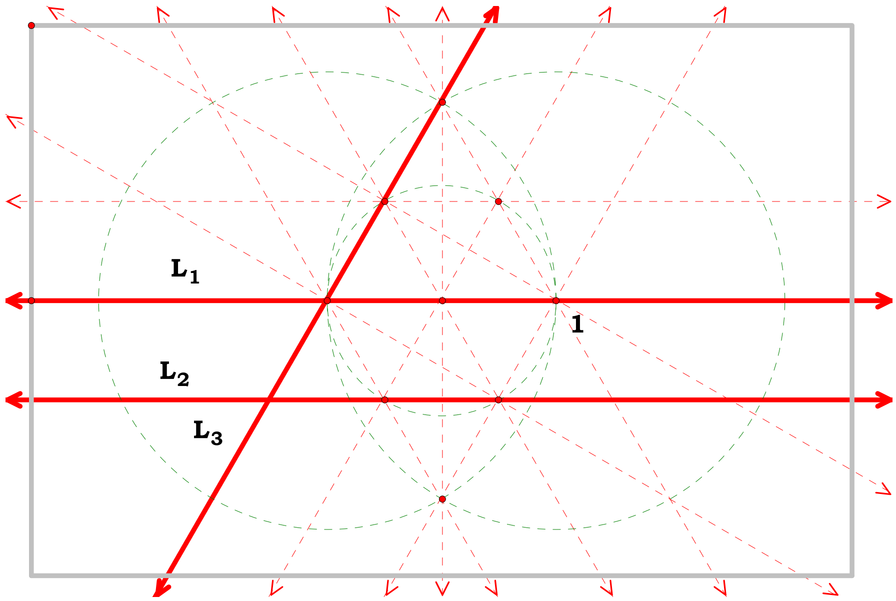


When I assert limits and form a simple one relative analog, I can name its correlatives A and B which contain some relative difference which, as it is wholly metaphorical, I need not name. I have made some one thing called a ***segment***, a *unit*, *one*, and *AB*, etc., i.e., I have combined the *elements of a thing* to make *a thing* and as the unit is common to every system of grammar, I can use each grammar system to name relatives and correlatives. A unit, a thing, because it is a binary, is said to be dialectical and even a dimension, or mentionable by its two elements. The simple analog is the geometric name and I can pair that name to Common Grammar, Arithmetic and Algebra.

However, it is arithmetic as a recursion of the unit, one can only add and subtract from a single relative difference whereas the arithmetic uses dimensions for our own ability to write the grammars which are not expressed in the end result. We have to be able to distinguish between our self and what we use to make a name, and what the name, itself, is expressing.

We have then the analog in geometry. In common grammar, a segment, in arithmetic, 0 and 1 or simply 1, in algebra *AB* or as a combination, segment *AB*.

Parallel and Inclined

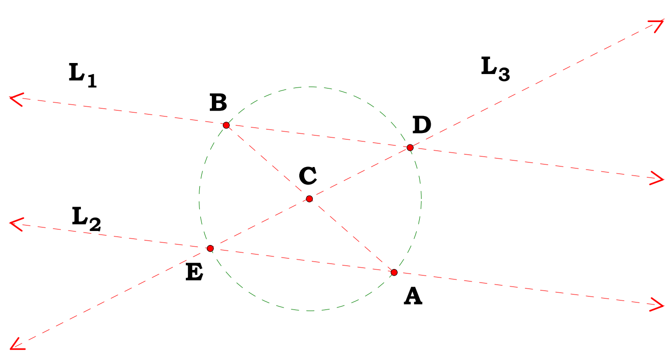


L1 and L2 are called ***parallel***, while L1 and L3 are called *inclined* also L2 and L3 are also called ***inclined***.

Another word for ***inclined*** is not angle, but ***angled***. Now this allows us the ability to draw and test for parallel and angle using our two tools, and not mistakes in judgment.

In plane geometry, we have only two relatives we are dealing with which in common grammar are called length and breadth. If only denote just one of these by a figure, it is called linear or length and is denoted arithmetically. If I am referring to both of these, it is geometric and denoted as a ration AB/CD or $\frac{ab}{cd}$, etc. If you are really stupid, and darn proud of it, you claim that you are too decorated and too incompetent to subtract 1 from 2.

Standard of Constructing Parallels



Our opening developed unit provides us with an example of how to standardize the construction of parallels. One of them is as above.

Given L_1 and A.

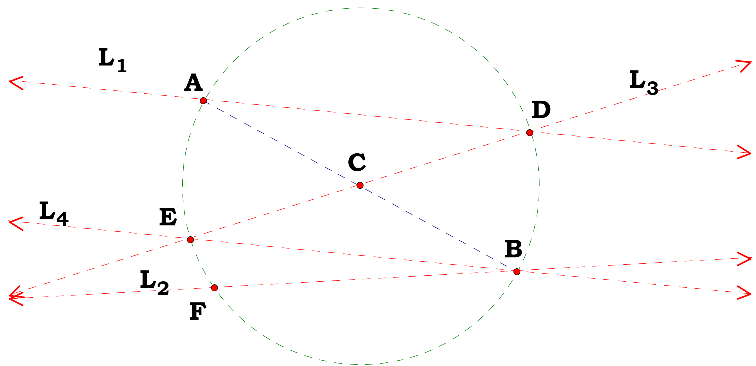
To draw with A, L_2 parallel to L_1.

Assert any B of L_1 and describe the segment AB and the midpoint of AB as C. With either CA or CB describe the circle. Denote D and with CD produce L_3. Produce E. Produce L_2 with AE. Now as this produces two pair of equal triangles, all things and thus their elements being equal, we have produced L_2 as required.

One can be as concise or as *War and Peace* as they desire, but there is the standard developed unit, by which to figure out methods of standardizing the construction and demonstrations in geometry.

Standard to Test a Construction

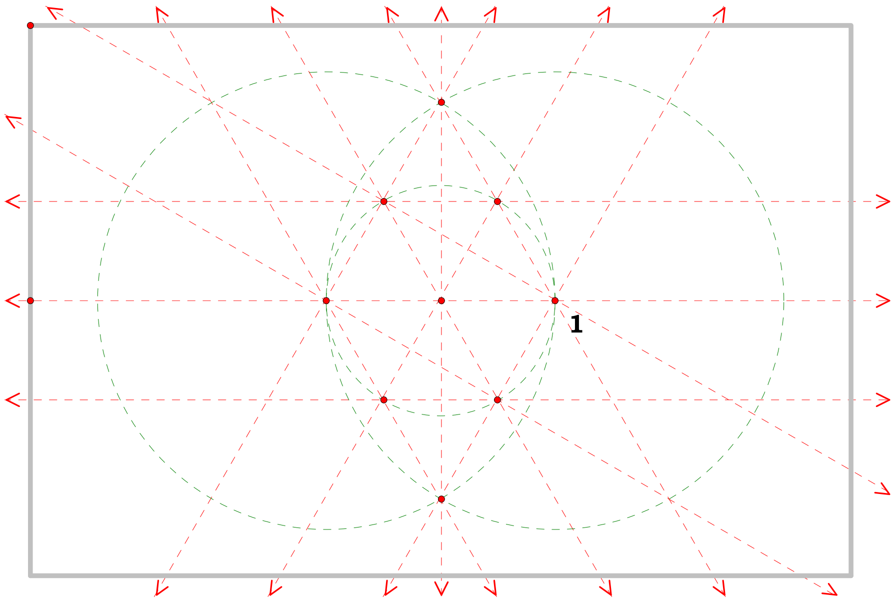
Let us say that you went hiking one day and found a treasure map and wanted to know if two lines on the map were parallel. You want to be rich!



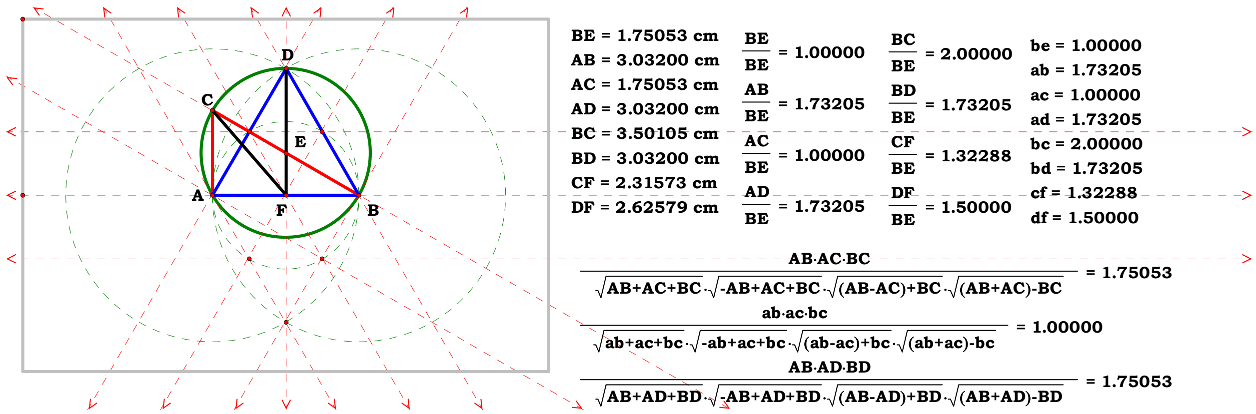
Name the lines L_1 and L_2. Assert A of L_1 and B of L_2. Describe AB and midpoint C. Describe CD, L_3 and E. If L_1 and L_2 are parallel, there will be no L_4 and the rest should not only be obvious, but a statement that if these lines are not parallel they will intersect at a point. As a figure is proportional, EBF would be the proportional answer to that fact no matter if one can possibly draw the figure proportional to the answer or not.

So, the lines, here, are not parallel and one can compute the distance between EB from the map but only to find that someone has built a shopping mall over your treasure, or that some inter-dimensional super intelligent being has created a mythical land of Infinity where Parallel Lines are not so special at all. If there were no parallel lines, there could not possibly be grammar for recursion of the unit would be de facto denied. One has to be really stupid to spin these yarns.

Plane



The full power of a straightedge and compass is revealed through recursion which produces not something arithmetic, but something geometric, a second relative difference is implied in the very fact that a compass is possible. We can, as Plato said, as your own experiences tell you, just name the elements of a thing. One of set of names we give this *two*-ness is parallel and angle, another is width and height. But a more convincing way to denote the fact that there are two different kinds of units, interdependent on each other is denoted by solving for that unit, itself, using another system of binary grammar, Algebra. When we draw a segment we see the one, now we need to draw how to show the other one, second unit. We opened with showing how to construct the one-dimensional, now we have to show how to construct the two-dimensional. The actual proposition which implies this is Proposition 48. The problem is, one is named by arithmetic, while the second one is much more complicated for everything else comes into existence because of it. We have to find two things which end up with the same name in our original given staring unit. And if one can follow the implications given in the propositions from 1 to 48, and a standard high school education, one should be able to do the following in Algebra which I will show in what I call, Proposition 49 in the propositions.



Before one can grasp dimensional progression, a distinction between self and not self, between an arithmetic identity and a geometric identity, between arithmetic, literal equality and proportional or metaphorical equality, one has to reach the end of the one, the arithmetic in order to correctly name the other one. Thus, unlike like the very cute mathematicians who imagine dimensional progression as being the product of arithmetic which they can name at will, dimensional progression, in order to be defined for that unit, one has to know how to prove it as a distinct unit and as a product of all that has gone before it, yet producing a new One. One actually has to learn the relative differences one at a time to be able to even hope to show the next relative in its order.

Now, one knows why the puzzle is put as I am alpha and omega, the beginning and the end for demonstrating dimensional progression is recursion of the intelligible and the intelligible has to parallel the perceptible.

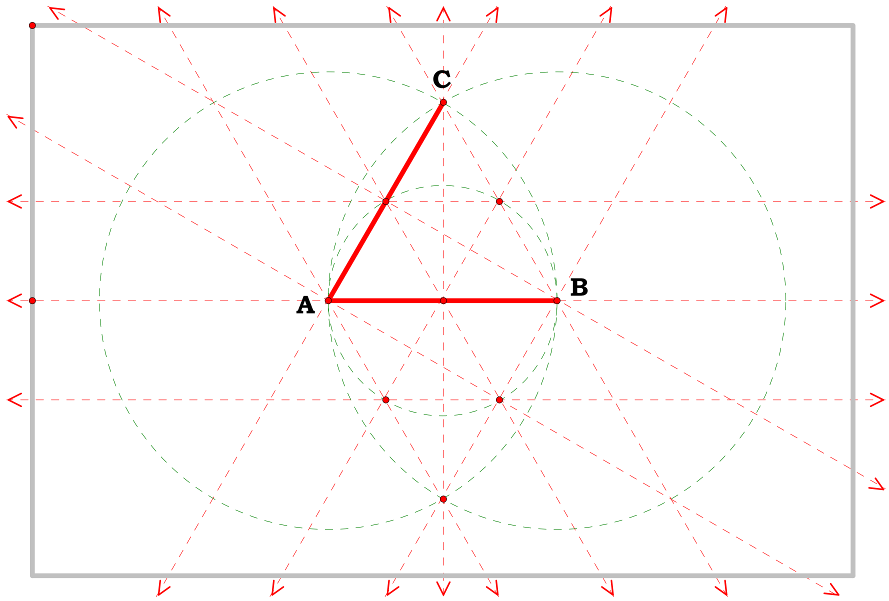
When we understand this second unit, which is independent of apparent magnitude, then we can understand the remaining names on our list of assignments.

One should be very clear then, that we start with a perceptible one, and we find that in order to get to our next unit, our mind has to grow into it, grow to comprehend an intelligible, a metaphorical, unit. Thus, our one has now become a prophet which is telling us the ideas which must be mastered in order to complete just Book 1 of the *Elements*.

And the above is the point the author of the Bible was making when it is repeatedly stated in the text that mankind can neither understand or read that book until after a cusp point in human evolution takes place, until mankind learns not only literal progression, but also metaphorical progression, between literal equality and metaphorical equality, and this knowledge is knowable just by how you process symbols, even read.

It is not possible for an illiterate to write a formal grammar system, but a species will eventually learn if they keep trying, keep applying the mental stress to evolve.

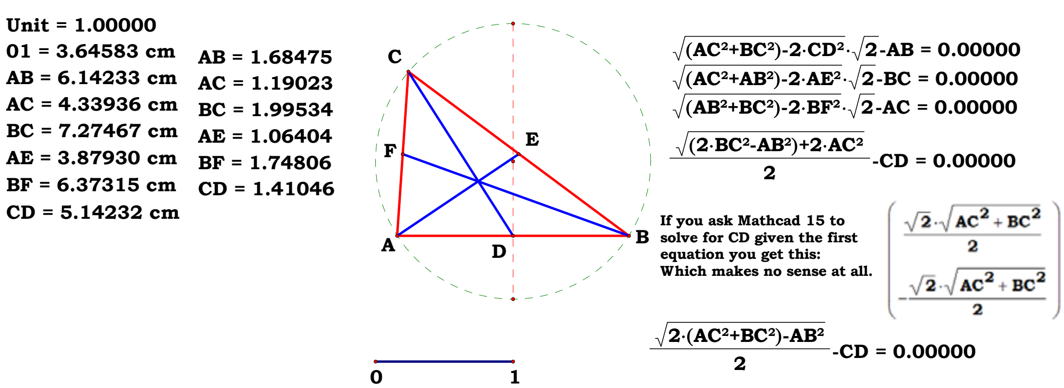
Angle



8. A plane angle is the inclination to one another of two lines in a plane which meet one another and do not lie in a straight line.

Awkward and not precise.

CAB when called an ***angle*** means the segment *AC* and *AB* are given, but *BC* is not and one can simply complete the triangle *in situ*. Thus a triangle is representable as a triplicate ratio. Neither my work, nor the *Elements* is this ratio actually used for any specific angle, but Book 1 of the *Elements* does give you enough information such that with elementary algebra, the reader should be able to figure it out and every angle will then be equal to the remaining segment in the triangle as implied in the *Elements*, so here is the result:



What is implied is the proportion between two segments denoted by the third side when a unit is given. Thus, to compare two angles, one has to complete the triangle and the propositions given in the text show you how to do this. Trigonometry and mathematicians claim that one has to use Trig to do the math, but neither in the *Elements* nor in my work, is such a claim substantiated. Trig is factually superfluous and can not be said to be a formal math but it does demonstrate ignorance.

One will notice, by definition, an angle is two segments with a common boundary and that they are proportional. A one-dimensional thing is not capable of demonstrating proportion. So, one can say such things as collinear, and in a straight line, but the fact is, a segment is arithmetic, while an angle is defined as geometric. This means that given two segments expressing a geometric identity with a common boundary, a ratio is, by definition, expressed by them even if that ratio is superfluous to the demonstration, that ratio would, of course, be established by the circle which circumscribes the completed triangle.

With what is given, one should come to the conclusion that the side of a triangle can only reach up to 2 in proportion to the unit, therefore, using the unit to establish the ratio, given any two sides of a triangle in ratio to the unit, the third side can always be found for any triangle. I provide the mathematics for that, which can also be surmised from what is given in just the traditional Book 1 of the *Elements*. So much for that nonsense called Trigonometry.

One can say, however, the two dimensional mathematics of the circle has yet to be examined in detail. A little bit of that I have demonstrated in The Delian Quest. Due to the lack of development in basics, however, I personally have had little time for it.

Angle Scholia

Why do mathematicians assume that Trig is valid for Euclidean Geometry when it is never even mentioned? The fact is, it is forbidden as it does not use the same method of recursion as Geometry. It is because they do not understand what is written. Those who claim that Trig is the Math for an angle say so because they are simply stupid.

By putting the definitions together, in regard to an angle, you arrive at the conclusion that the angle produces a segment in a circle which is a ratio, not an arithmetic measurement. And that the ratio for an angle is between 0 and 2, not between 0 and 180 degrees. So, how do you draw this?

You can measure the both sides of any triangle in whatever arithmetic system you want for it is the actual definition of an angle in this book, but then you have to use those measures so as to produce a ratio to 2.

Unit = 1.00000

2 = 2.00000

N_1 = 2.97091

N_2 = 1.74357

A = 0.67319

B = 1.14707

N_3 = 1.22578

C = 1.63161

$\frac{2}{A} = 2.97091$

$\frac{2}{B} = 1.74357$

$\frac{2}{C} = 1.22578$

$\frac{A}{2} = 0.33660$

$\frac{B}{2} = 0.57354$

$\frac{C}{2} = 0.81580$

m∠ABC = 19.66971°

sin(m∠ABC) = 0.33660

m∠BAC = 34.99724°

sin(m∠BAC) = 0.57354

m∠ACB = 125.33305°

sin(m∠ACB) = 0.81580

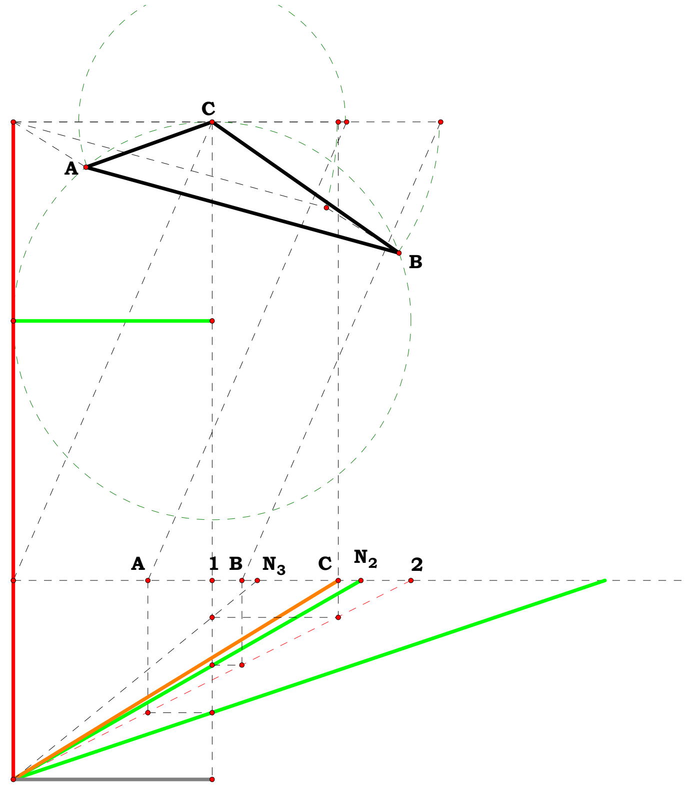
$\frac{A}{2}$-sin(m∠ABC) = 0.00000

$\frac{B}{2}$-sin(m∠BAC) = 0.00000

$\frac{C}{2}$-sin(m∠ACB) = 0.00000

$$\frac{A \cdot B \cdot C}{\sqrt{(A+B+C)\cdot(-A+B+C)\cdot((A-B)+C)\cdot((A+B)-C)}} = 1.00000$$

The measure of an angle is the segment set into ratio to 2. This is what Book 1 definitions work out as.

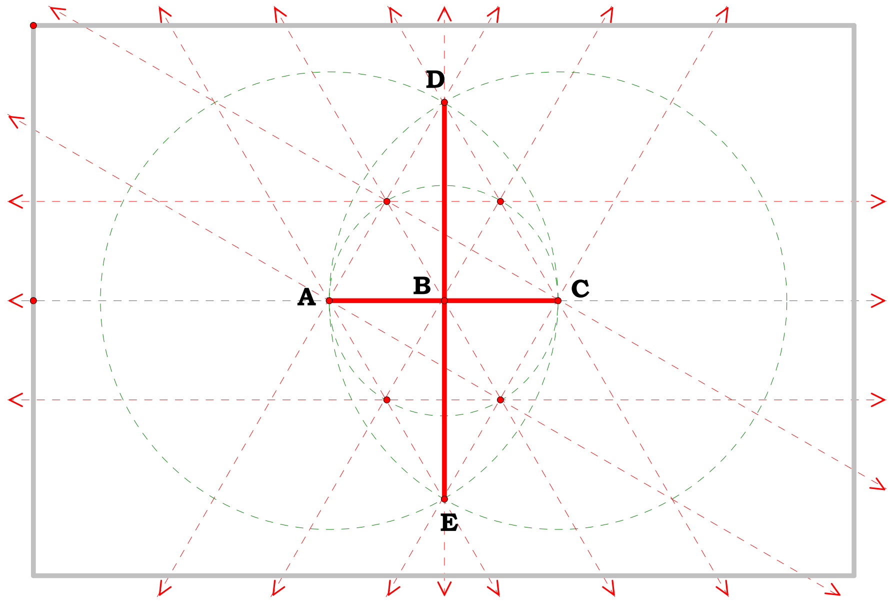


Given N_1 and N_2 you simply place them in the unit figure, and produce N_3. From what you can do with just the opening definitions, you should be able to understand that there never was any need for the mysticism called trig. Trigonometry is not even in the Elements and it does not have to be, if you want to work with angles in triplicate, it is implied in the first set of definitions in the Elements. Personally, I have found no time to play with it as the I am developing the whole of BAG.

Now, if N_1 and N_2 are too large, you know how to proportion them to any size you please. This will change the physical size of the triangle in your figure, but all angles will be the same. Do not think in terms of arithmetic size and you should understand it.

One will notice, I put a section of Trig in the plate to show that every angle is a function of the sine, but that it is simply half of a segment and has nothing to do with right-triangles. I do not even use that section in the plate. As I said, I always read as if I am examining psychological disorders and one place to read, which is the scariest, is in those claiming to be educated. They tell you they have the math down even for the creation of the Universe, yet they cannot even comprehend a circle? Sounds like a very hard case of schizophrenia to me.

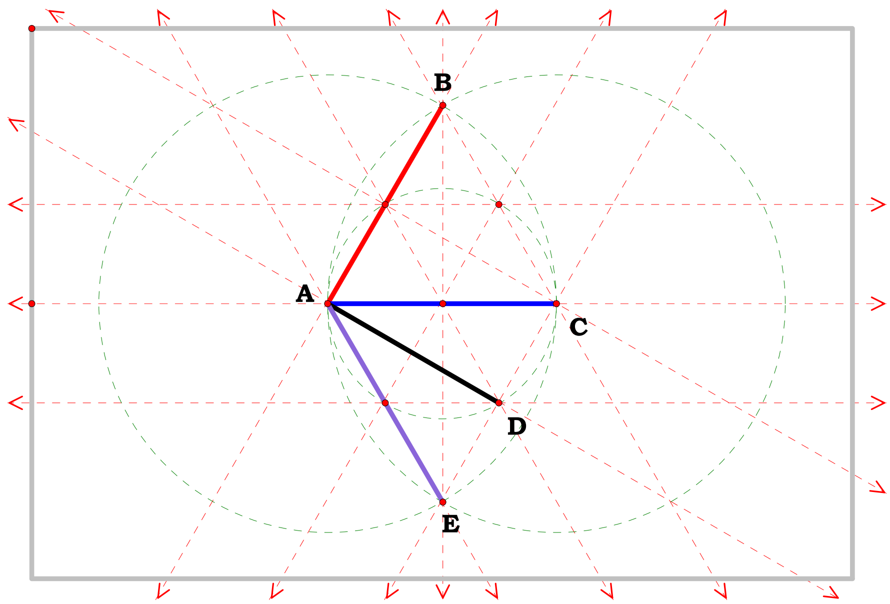
Perpendicular



Segments AC and DE are said to be ***perpendicular*** to each other.

Now it is very true, that one can construct perpendicular lines in many ways, but for the establishment of nomenclature, one gives the standard from which that fact can be tested and verified no matter which method of constructing it is determined *in situ* or by personal choice.

Acute, Right, Obtuse



The angle BAC is said to be ***acute***.

The angle BAD is said to be ***right***.

The angle BAE is said to be ***obtuse***.

One could have done something similar such the angle BAC is said to be equilateral. The angle BAE bilateral, and the angle BAD scalene; which would have babbled those who even imagine that geometry admits anything about Trigonometry at all.

Boundary and Figure

13. *A **boundary** is that which is an **extremity** of **anything**.*

14. *A **figure** is that which is **contained** by any **boundary** or **boundaries**.*

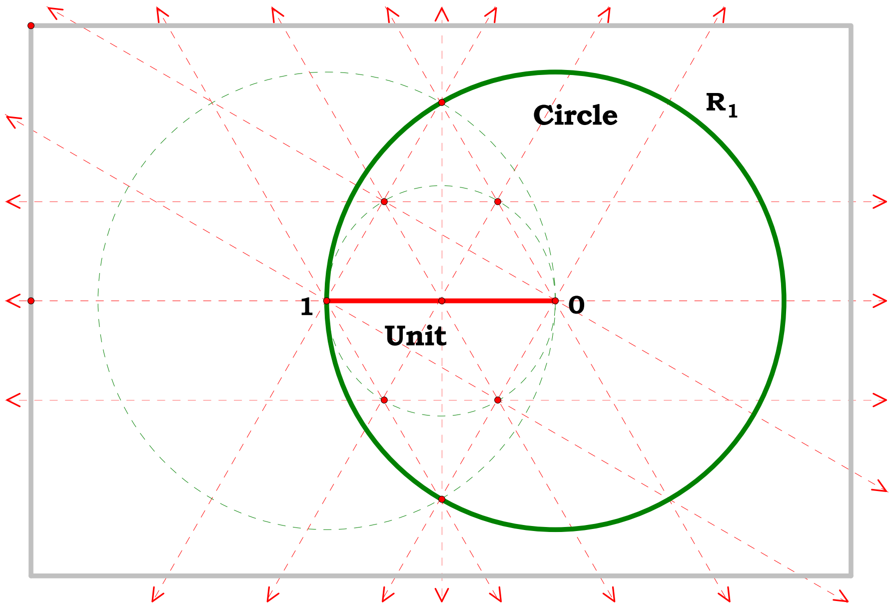
It is at about this point in the *Elements* where the original author thought that a reader should be introduced to a couple of words which denote the intelligible binary. And so, it seems that the original author understood that it would take previous perceptible examples before introducing the reader to names which do not name anything perceptible, but are names for classes, i.e. the two parts of speech, which all other words are either members of the one or the other, nouns and verbs.

But as mankind has demonstrated, when one is simple, they cannot comprehend the metaphors of the Bible, the words of Plato, or the examples of Euclid, but it is a confirmation of evolution of the intelligible which is not comprehended in the works of Darwin.

So, we have actually two orders to write the grammar by, one fit for students, and one which a teacher needs to acquire before writing those books for students. By construction, then, this book appears to be made for students with experience which so far, none of its commentators seem to have achieved.

Now a problem with the original author of the *Elements* was just this, for example, having defined line as a particular boundary name for a segment, which is arithmetic, he uses the same word for the geometric, making the term synonymous with the circumference of a circle, which is a technical violation of nomenclature: his terms were not, in this case, properly denoting a correct indexing. Not even the term locus or loci are correct as they denote what is projected by the figure by a previous construction. The results could be either linear or not. In fact, we use them for what are also called wave forms. All wave forms are also loci. The term loci does not indicate a type which is required for a definition.

Circle Center of a Circle, Contained by



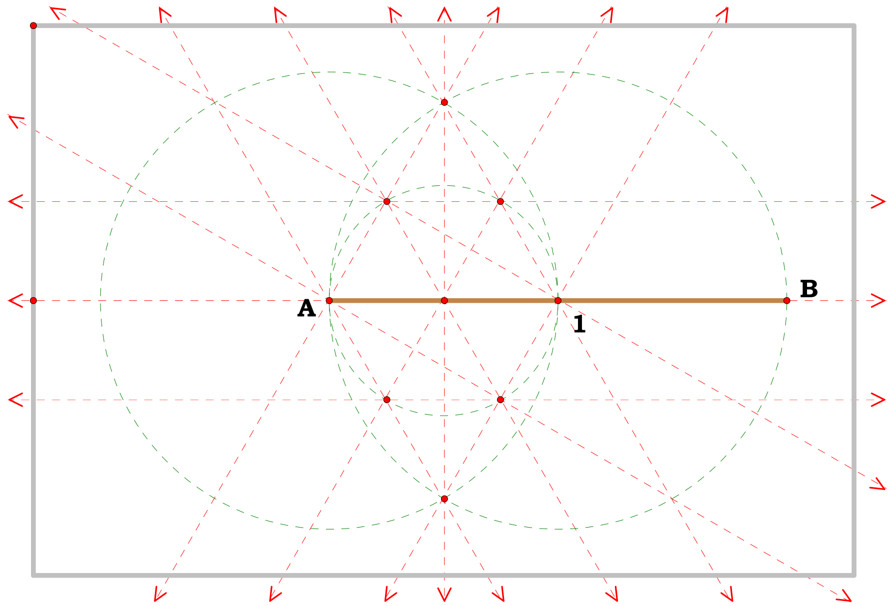
01 is a unit ***segment*** and also called a ***radius*** meaning a segment which can be used to project the very same circumference of the present circle. R_1 is a *single recursion* of the unit segment called a ***circumference***. ***Point*** 0 is called the ***center of the circle***, or the center of the recursion of 1 such that any line of which point 0 is asserted of, produces by assertion a segment equal to our unit by that same circumference. Thus the segment 01 is a standard by which the recursion is effected to produce circumference R_1.

So, where our segment is a product of asserting limits to a line, a circle is the product of asserting a limit to every line of our second dimension. A locus is actually the product of any relative difference of ours which can be applied to write a grammar. A straightedge we use to produce a unit, a compass we use to describe its universe of discourse, here being a plane of reference.

Many make a mistake thinking that the grammar we write actually predicates of the elements of existence, which is not only impossible, but also a self-referential fallacy.

Many people think that the circumference is the circle, however, the circle is the figure within the circumference.

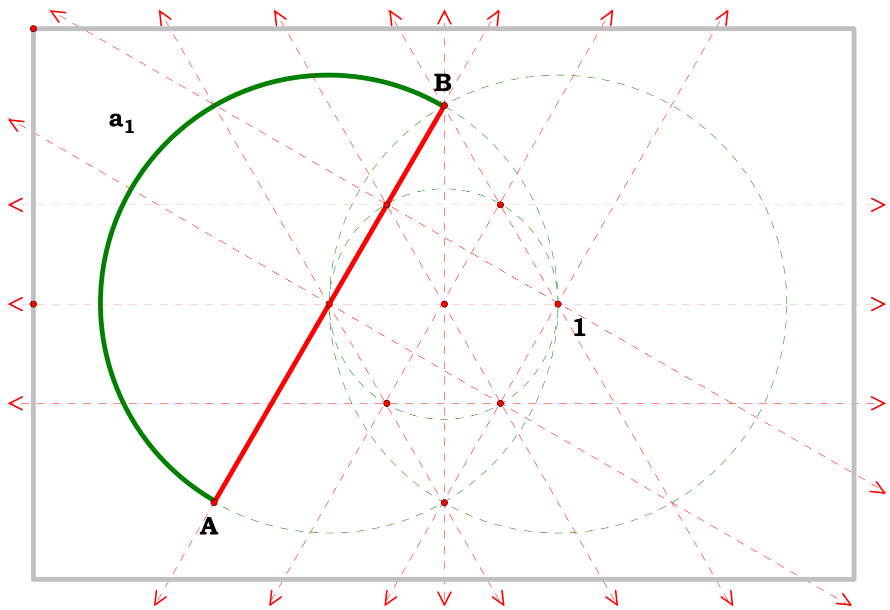
Diameter



Segment AB, which is twice A1, is called a ***diameter***.

A segment, which divides a figure into equal halves, is said to be a ***diameter***.

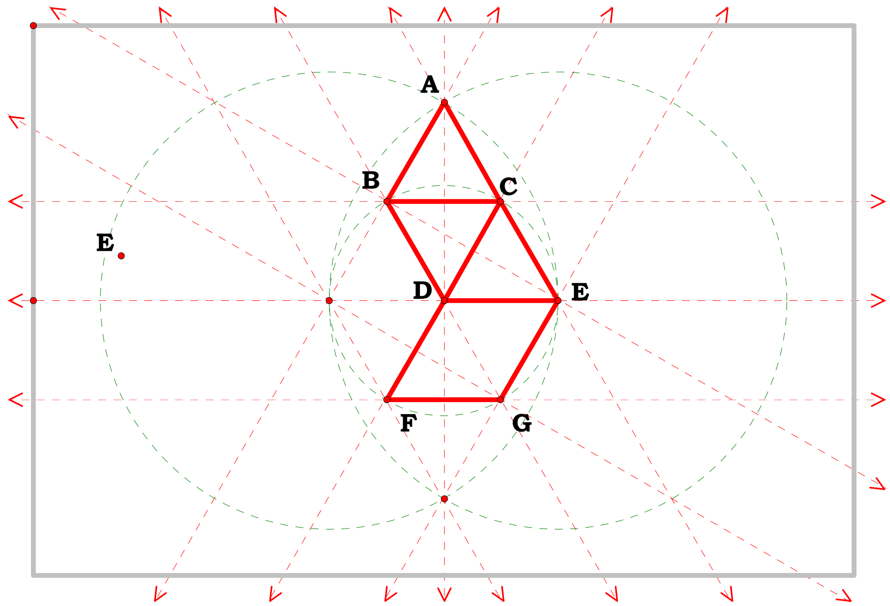
Semi-Circle, Segment of a Circle, Chord, Arc



AB and a_1 contain the figure called a ***semicircle***.

And for future reference: *A* ***Segment of a Circle***, or ***Chord*** is the same save as AB but does not include the center of the circle and a_1 is called an ***Arc***.

Rectilinear Figures



Rectilinear figures are contained by segments.

A ***trilateral figure***, such as ABC is contained by 3.

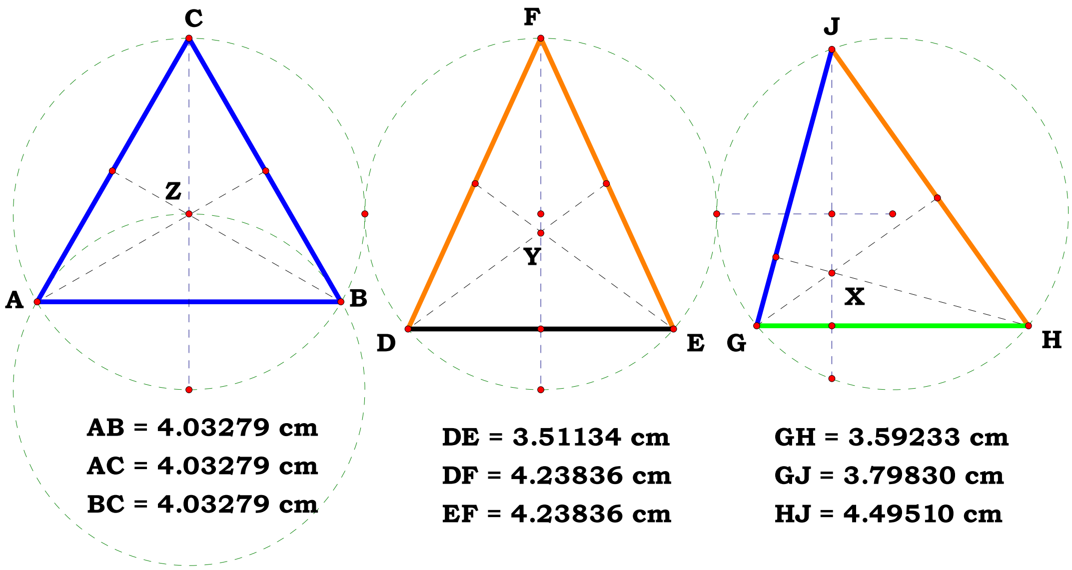
A ***Quadrilateral***, such as DFGE, are contained by 4.

A ***Multilateral***, such as ABDFGE, is contained by more than 4.

One will notice what the names, at the vertices of a figure helps us do, it is a map for your eyes and hand to follow.

Some contemporaries actually believe that mesh mapping with triangles is new. Mesh mapping is still based on a unit circle.

Trilateral Figures



Triangle ABC is said to be ***equilateral*** or ***unilateral***:

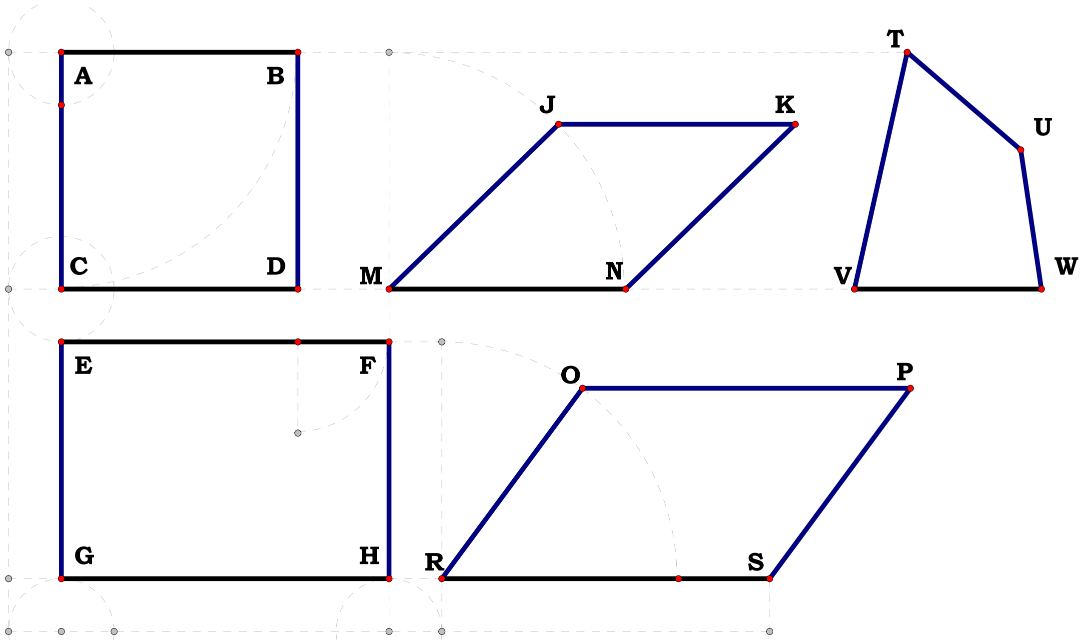
Triangle DEF is said to be ***bilateral*** or ***isosceles***:

Triangle GHJ is said to be ***multilateral*** or ***scalene***: Where the lateral equality is determined by the comparative lengths of each side.

So, one can see the complete standard, then one short of a criteria, and the last short again.

The determination can also be made using Z, Y, X, I relation to the center of the circle within which they are described. If one will notice that progression is no difference, one difference, and two differences, or point, and line, and if line, perpendicular, parallel, or angled, to the bases.

Quadrilateral Figures



Of quadrilateral figures, a ***square*** such as ABCD is that which is both equilateral and right-angled;

An ***oblong*** such as EFGH that which is right-angled but not equilateral;

A ***rhombus*** such as JKMN that which is equilateral but not right-angled;

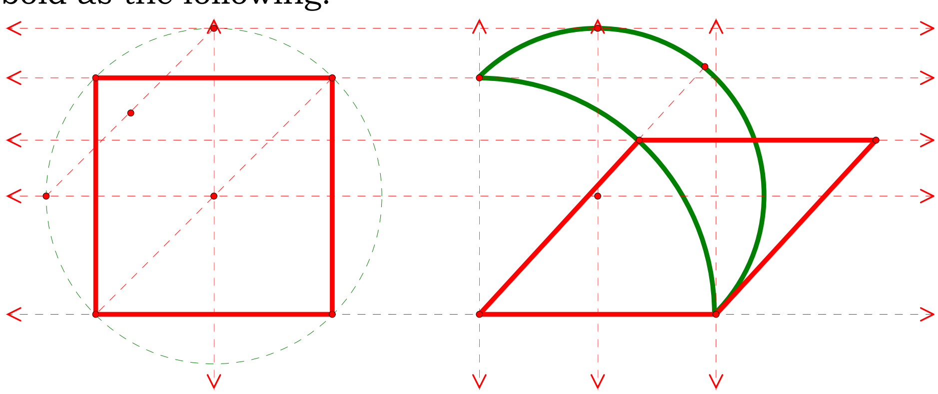
A ***rhomboid*** such as OPRS that which has its opposite sides and angles equal to one another but is neither equilateral nor right-angled.

And let quadrilaterals such as TUVW other than these be called ***trapezia***.

Nothing like a straight modification of Heath.

The above graphic shows how to turn any square into a rhombus and an oblong into a rhomboid. In short, our first four figures are constructed on standards, while the remaining is not. Every one of these figures is actually a composite of triangles.

One can actually use what is called a lune here to construct the rhombus and rhomboid as the following.



BOOK I.

Contents

Honey Dew

Transform proposition emphasizing construction by the student.

Transform proofs to emphasize construction by student and what they are also saying themselves.

equal to two right angles fix this to comply with the definition of an angle, the result is a single line, segment, etc.

Correlative terms: subtending and containing.

scan for straight and rectilineal

A line

The Pythagorean Theorem

How does one bring attention to the fact that the three segments of a triangle form a specific and provable ratio? AB : AC = BC, which is the definition of an angle. But, what is that relationship? It is not solved in the *Elements*, the closest to be had here is the so called Pythagorean Theorem. I started my study of the *Elements* in 1994, I got a Dover reprint of Heath, but in 1993 I solved the problem and it has to do with a write up I did for circumscribing a triangle. *The squares on any two sides of a triangle are equal to half the square on the remaining side plus twice the square on the medial bisector*. At the right angle, these two lines are superimposed and indistinguishable. The Pythagorean Theorem is only an arithmetic answer to a particular placement, Trigonometry is simply a Band-Aid for ignorance, but then neither can Cartesian Geometry nor Calculus stand against *Basic Analog Grammar* composed of simple geometry and algebra, against grammar systems developed by provable binary recursion, the *Elements* of the Universe.

However, these first four Books are all about exploring the straightedge and compass which will eventually lead to competence in the grammar. One has to remember, this project Plato outlined in his work, especially the *Republic* and Euclid was one of the geometers aiding him, however, Euclid was, as we find in Heath, younger than any of Plato's students. The work to formalize geometry as a paradigm for all grammar systems died with Plato. Plato had the most gifted mind of his age, and for thousands of years after him. No one, since his time, has had the wit to comprehend that all grammar is binary information processing and as can be seen even today, not even those who make computers comprehend it.

If it were applied

It seems that many people experience, what do I call it? a brain fart or a brain freeze? a hole in their mind when it comes to using the Law of Identity, or the element of a correlative. Geometry is a written system of grammar and like all written systems of grammar equality is in the behavior of the person producing grammar and so, one can say that equality of behavior produces equality of results. I could call it Yoga, Patanjali's metaphor for it, but perhaps I should simply call it the Law of Identity as expressed by Virtualization or Grammar Mechanics. But all of the following has too many letters, so how about Application Identity for equal relative differences, or behaviors, produce equal limits or results. Now anyone can state the Law of Identity and anyone can be too stupid to simply defer to it.

The wording in the propositions is *if you superimpose* then one will see the equality which means, equal behaviors to produce equal things will produce equal results. How anyone can claim that an equality establishes for the inanimate does not apply to the animate, is only because someone is simply stupid. The definition of equality does not have any stipulation that it is class specific, but a universal. How can anyone believe that the equality of the inanimate, straightedge and compass, becomes negated because those tools are in the hands of a monkey?

Completing the Angle

One of the items these propositions are emphasizing is that it is not possible to make any statement about the angle without completing it in reference to some particular triangle. Yet people insist on not completing it despite the whole of this work which means that those who do not complete the triangle for any given angle, do not comprehend the definition of an angle at all. Try to remember this, to solve for many problems you have to complete the square and a square is simply two triangles.

One will notice many propositions where it says that an angle is contained by such and such sides, that angle is a synonym for the segment common to these pair. Therefore, in order to work with angles, one has to comprehend that they often being told to complete the angle to do a particular demonstration.

One can say that an angle can be said to be particular, or universal, particular to one segment or that a proposition is true for any segment that can be constructed between a pair of lines.

Binary Recursion

Arithmetic progression is perceptible, very perceptible, while geometric progression is not, it is intelligible. Therefore, for each dimensional progression, each dimension will be defined in terms of a geometric unit specific to that number of relative differences which are denotable in that matrix. Thus, one has to find, and proof, the base figure for any claimed number of dimensions and show the evolution of the unit accordingly, this is why the ability to formulate the correct equation for any triangle is imperative for plane geometry and to learn it as a grammar. As Plato said, in the examination of any thing, one only knows that thing when they can trace its genealogy back to the first principle, a single binary unit. Only when that can be done, one can formulate a grammar using a specific number of dimensional accounts.

Fortunately, the general outline of memory mapping become available with only two dimensions, one for each of our binary intelligibles for it is this that makes grammar usable and expressible for every other grammar system regardless of the number of dimensions employed. In short, this is how we can even flatten time itself. Grammar is Flatland.

Principles of Predication

One of the major problems with the *Elements* is that the author appears to be evolving nomenclature fit for this project. For example, the word segment is not introduced until Book 2 Proposition 1, but although its meaning is implied, it is never defined. The terminology is rather fuzzy in the text.

Here is the problem which has then been introduced. One cannot predicate of an element of a thing, either the relative or the absolute. The elements of a thing are the predicates of a thing. Thus, when one names one of the elements of a segment we have from the start a name conflict. A line as an element, then a straight line in an attempt to figure out a word for the unit thing, which eventually becomes a segment, but it is still used badly.

What is needed is what is a fact, we start with a variable segment from which we can slice and dice our final product, but once we have termed our starting linear difference with the name of line, we can no longer use it as if it is the name of a thing. Defining a line as simply linear means that there is no adjective which can be used to claim that linear is nor than one relative difference by such terms as straight lines, or the line called a circumference, in short, the nomenclature of this work is as it was left by the original author, in a primitive and incorrect state. So, what I am going to do is say that a line is simply linear and that its limits are points, but a line is a variable which is always big enough to carve segments we are writing about. When denoting a variable, then, we use line, when denoting a constructed thing, a segment.

A grammar systems does not predicate a thing about reality, we only name the parts of things. Thus, those who claim that by some mystical magic, lines somehow preexist and become so heavy they are driven by gravity to attract each other, meet and make babies, well, I leave that sort of rubbish to MIT students. Moron's have worked the big bang into geometry even before more modern Einsteins.

As line is defined, from the start as linear, or one relative difference, there is no such thing as different species of lines. As every possible grammar is effected by complete induction and deduction of a unit, a curve, a wave form, is simply a linear function which is often called a loci, but loci has noting to do with the so called "set of all this or that" it simply denotes a variable, simple or compound. A set is a thing, and the elements of a thing are certainly not things. We are expressing a grammar system; therefore, we are always speaking about the set of our behaviors attempting to express the elements of things which produce the grammar.

The Declination of Intelligence

There are those who have spent a considerable amount of time in their life trying to figure out that 2 minus 1 must equal 1. As a plane has two, and only two, relative differences to manage, we can say then that there are two, and only two states a one dimensional thing can have in relation to another if they are considered both as a unit. Either they are inclined one to the other, or not. If they are not, then their relationship is simply arithmetic. If they are, then their relationship is geometric. In the first case we name the condition parallel, and in the other inclined or angled. It is simply a matter of doing the math. If we have a unit, then the unit is either arithmetically treated or geometrically treated. So, given two dimensions, for two one dimensional things, the difference between them is either 1 or 2.

However, at the time, there was a race for the breaking of the sound barrier. The losers were simply quite, while the winners filled the air with gibberish.

Many of the examples in the following using angles concerns the result, is the result arithmetic or geometric. If you have trouble subtracting 1 from 2, it will be very confusing.

Unused Resources

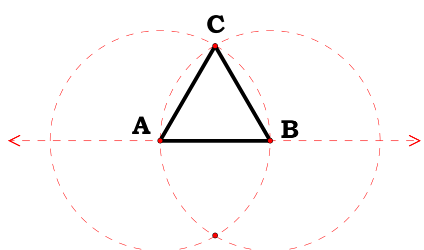
Book 1 of the *Elements* set out to demonstrate a distinction between the arithmetic unit of the segment versus the geometric unit of the triangle, however, it did not achieve that goal, but not through lack of resources in the demonstrations, or so I believe, but through the lack of intelligence to use those resources. Part of my aim is to finish Book One with that distinction.

PROPOSITIONS.

Proposition 1. Duplicate a unit in place.

One is given two tools, a straightedge to make a segment and a compass by which that segment can be recursively produced, even virtualized, in order to produce the written grammar called Geometry. How do we duplicate a thing as a virtualization by a standard is what grammar is all about. How we recursively apply, or multiply any thing through grammar. This first proposition will demonstrate Geometric Progression of the Unit, or thing, and we will learn it by behavioral skills acquired by training our own hand for the duplication of results, i.e. how to be true in deed. One is going to learn to pay attention to the standardization of the behavior of your own hand.

Equilateral triangle, rhombus quadrilateral and perpendicular construction.
An equilateral triangle is a triangle with all three sides equal.



Construct any segment *AB* to be the side of the triangle. It will be a unit, a thing, a standard by which we repeat to make our triangle.

With *A*, one of the limits, boundaries, or correlatives of segment *AB*, construct the circle *AB*.

Again with *B*, the other limit or correlative of *AB*, construct the circle *BA*; you will then have constructed two circles using both of the correlatives *A* and *B* of segment *AB*, one named *AB* and the other *BA*. The center point of the name of a circle is the first correlative in the name, while the second is the remaining correlative.

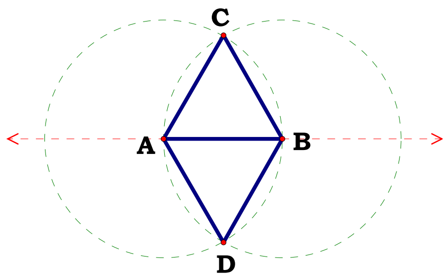
These two circles will be intersecting as AB is the relative difference between its own correlatives AB. Choose one of the intersecting correlatives and name it C. From *C*, in which the circles intersect one another describe the segments *CA* and *CB*.

Therefore the three segments *CA*, *AB*, *BC* are equal to one another.

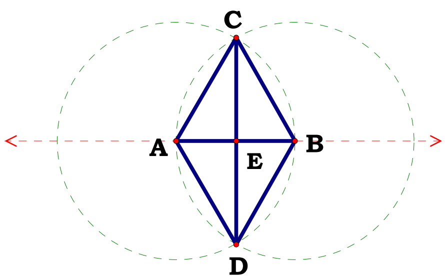
By a given standard thing *AB* we have, by our own hand, duplicated it twice. We have learnt to count, with our hand, up to three. We can transcribe this as $1 + 1 + 1 = 3$, or as $1 \times 1 \times 1 = 1$. In one case we are looking at the process arithmetically in relation to the motion of our hand, in the second place as the motion of our hand multiplied to produce a geometric figure or again, algebraic unit. In any case, we see how the many motions of our hand becomes one particular thing and how by the one standard thing is transformed into the many behaviors of

our hand. In such statements, we see that one term is perceptible, while the other intelligible.

If we proceed and name the remaining correlative *D*, we construct a rhombus by describing *DA* and *DB* which is an equilateral quadrilateral, meaning that we have used way too many letters. The rhombus simply lacks a right angle.



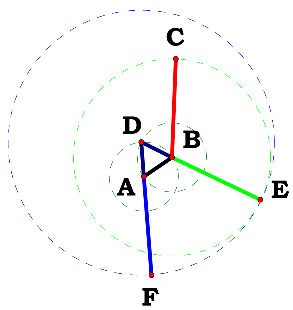
If we now take our construction one step further, and describe *CD*, we have constructed *CD* intersecting *AB* and they are called perpendicular to each other. Let us name the intersection E. All constructed segments are equal and it produces an intersection resulting in four equal right triangles, *AEC*, *BEC*, *AED*, *BED*.



Proposition 2. Duplicate a unit at a distance.

Now we are going to duplicate the segment at any place which is an arithmetic progression.

Construct a segment and then copy it to some other point.



Construct a segment with the name *BC* and assert point *A* as the place where you want to copy that segment to. And, as you have a really uptight boss, show your work.

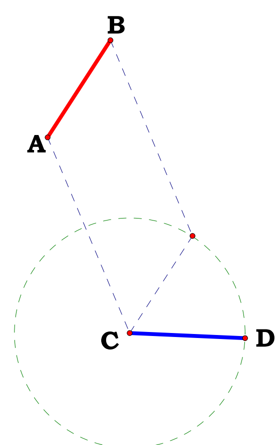
With the correlatives named *A* and *B*, describe the segment *AB* and with the point *B*, describe the circle *BC.*

With the segment *AB*, describe the equilateral triangle *DAB*.

Inline with *DB* produce the segment *DE*. With center *D* and *E* produce the circle *DE*.

Inline with *AD* produce *DF*. As *BE* is equal to *BC*, and *DF* is equal to *DE* and *AD* to *BD*, then *AF* is equal to *BE* which is equal to *BC*, which was required.

Now, if I want to shorten this, I could simply construct a parallelogram to do so such as:



A parallelogram carries with it the original inclination and respective differences to a destination point, everything one needs in a little package. Which I personally prefer, especially since we are now using drawing programs. The advantage here is that I can put the product *CD* in any position at all at the destination, and it is not so clumsy. However, we are not up to parallels yet, and have to wait for it.

P_2 is said to be production by an arithmetic sequence, while the alternative, which you will come to learn is called a geometric sequence which simply implies often a great number of arithmetic sequences for its production. One can call the parallelogram used in this manner, a function of, for example, *AB*.

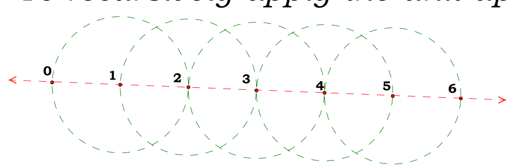
Proposition 2b. Recursion of the Unit, linear.

What should you take away from the above two propositions so far? Equality simply means no difference, yet equality is divided between the perceptible, what you experience from the external world, and the intelligible, your ability to mentally manipulate information through grammar systems. Thus, perceptibly we can make things which are all equal one to another through standards of physical behavior, intelligibly, we can judge things as equal through standards of mental behavior produced by standard systems of grammar. These grammar systems are a product of an intelligible binary over all creation, the elements of a thing. The intelligible binary over all creation affords us four methods of producing grammar systems based on binary recursion; Common Grammar, Arithmetic Algebra and Geometry. The Elements is then a grammar book attempting to teach you how to say the same thing, of the same things, in all four grammars of our grammar matrix.

We are doing what Patanjali, a Sanskrit scholar put into a metaphor of paralleling the perceptible with the intelligible, that metaphor is now maltreated as Yoga.

From the above, it will be assumed that one is bright enough to produce the following without, comment, to any line and to any number of recursions one so desires.

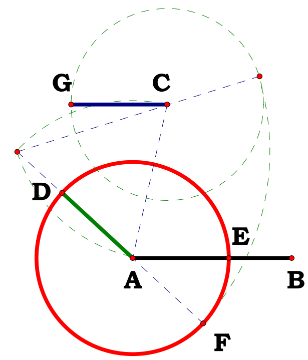
To recursively apply the unit upon any line and name the points, in order, starting from 0, *left to right and for six recursions or more if you insist.*



Proposition 3. Linear Division

We have actually performed this in the preceding but we are simply going to emphasize terminology and usage.

With two unequal segments divide the greater into two segments using a lesser segment as a standard reference.



Construct segments *AB* and *CG* so that *AB* is greater than CG.

Thus it is required to divide *AB* the greater using *CG* the less as a standard of reference.

At the point *A* construct *AD* as equal to the segment *CG*. This is accomplished by forming an equilateral triangle as in the previous two examples, P_1 and P_2. With center *A* the other extremity *D* describe the circle *AD*.

Since the point *A* is the center of the circle *AD*, name the intersection of circle *AD* with segment *AB* as *E*. This point of intersection is also called a divisor of *AB* at *E*. We have thus produced *E* which makes *AB* into *AE* and *BE*, all of which *AEB* being inline.

Therefore, if I want to create a set of points, I use the extremities as a container, such as *AB*, and place the contents of that container within it such as ***A****CDEFGH****B***. Putting commas between them all would be a bit much and would only be required if one were rather stupid, or if we grouped names by more than a single letter. With this we can construct a very concise, yet universal metaphor for a particular system of grammar such as *I am A and Z, the first and the last*: Which means, that given an alphabet in a grammar, I am the complete induction and deduction of those letters in that grammar, or the whole of wisdom producible, which is used to predict the results of everything in the Universe. This metaphor, may of course, be responded by being ignored, or it produces people who go off looking for a pooka, or not looking at all and just producing gibberish, or it will produce people who set off to learn to become literate. We respond to every thing according to the level of our own intelligence.

Observation on naming Greater and Less: *The arithmetic difference between two things is always contained within the limits of the greater*. And as the geometric ratio demonstrates, the relative difference between things is always established by an external standard. We learn to divide things in accordance with the application of some standard commensurate with the results we require.

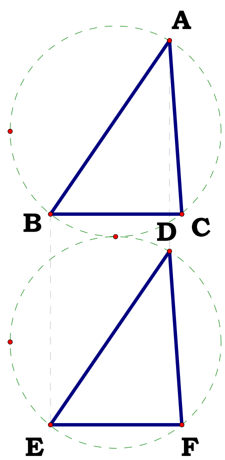
A whole topic on ethics and morals in a simple figure.

Proposition 4. Coincidental Metaphor

In the preceding, we have learnt how to use a standard, now we are going to use what we have learnt of standards to reproduce any triangle whatsoever, as if one were simply applying the first in place of a second. We are going to use a bit of metaphor. Or again, we are going to wrap up all of our behaviors for producing a thing, into a single word, coincidence. All of the operations used to make a copy of anything is wrapped up into a single word, co-incident, or same number of incidents. Learned behavior is behavior designed to produce coincidental results.

People, ignorant of the meaning of a word, become habitualized in thinking that it means something else, even exactly the opposite to that of the word itself. The mind is designed to learn coincidental behaviors. If you are really stupid, you will try to impose one figure on the other, but then you would have to do this by producing those same behaviors, in regard to the original, all over again and you would be stuck in a stupid loop.

Construct two triangles having the two sides equal, to two sides respectively, and having the angles contained by the equal segments equal, therefore they will, also, have the base equal, to the base, the triangle will be equal, to the triangle, and the remaining angles will be equal, to the remaining angles respectively, namely those which the equal sides subtend.



Construct *ABC*, *DEF* as two triangles having the two sides *AB*, *AC* equal to the two sides *DE*, *DF* respectively, namely *AB* to *DE* and *AC* to *DF* and the angle *BAC* equal to the angle *EDF*.

You have then said, just like the definition of an angle, that the base *BC* is also equal to the base *EF*, the triangle *ABC* is equal to the triangle *DEF*, and the remaining angles are be equal to the remaining angles respectively, namely those which the equal sides subtend, that is the angle *ABC* to the angle *DEF* and the angle *ACB* to the angle *DFE*.

For, you have produced the triangle *ABC*, step by step and you produce the triangle *DEF* by the standard of *ABC* as if the point *A* were placed on the point *D* and the segment *AB* on *DE*, therefore the point *B* will also coincide with *E* because *AB* is equal to *DE*. In short, a standard allows you to parallel your behavior independent of time, itself for you are learning to recursively apply your own memories.

Again, *AB* coinciding with *DE* the segment *AC* will also coincide with *DF* because the angle *BAC* is equal to the angle *EDF*; hence, also the point *C* will coincide with the point *F* because *AC* is again equal to *DF*.

But, also *B* coincided with *E*; hence the base *BC* will coincide with the base *EF*. Therefore, the base *BC* will coincide with *EF* and will be equal to it.

Thus, the whole triangle *ABC* will have been constructed equally with the whole triangle *DEF* and will be equal to it.

And the remaining angles will also be equal to the remaining angles, the angle *ABC* to the angle *DEF*, and the angle *ACB* to the angle, *DFE*.

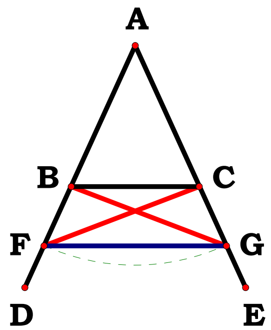
Therefore etc. (Being) what it was required to prove.

We are not proving the figure, we are learning to prove our behavior.

If A = B, C = D, and F = G, then ACF = BDG. For each part of each thing can be reproduced step by step; this is also called recursion.

Proposition 5. Adding Attachments, Proportionally

Now we are going to take our ability to understand equality of motion with the hand is used to construct equal results, we are going to use it to modify a figure, make it more complicated, by the addition of equal parts. The result is a lesson in proportion, or geometric equality.



In isosceles triangles the angles at the base are equal, to one another, and, if the equal segments be produced further, the angles under the base will be equal, to one another.

Or again, they are defined as equal, however, if you modify the figure and still have an isosceles triangle, then they will still be equal.

Construct *ABC* as an isosceles triangle having the side *AB* equal to the side *AC* and produce the segments *BD*, *CE* further inline with *AB*, *AC*.

You have said that the angle *ABC* is equal to the angle *ACB* and the angle *CBD* to the angle *BCE*. Or in short, the adjacent angles are also equal.

Take a point *F* at random on *BD* subtract from *AE*, the greater, *AG* equal to *AF* and let the segments *FC*, *GB*, be described.

Then, since *AF* is equal to *AG* and *AB* to *AC* the two sides *FA*, *AC*, are equal to the two sides *GA*, *AB* respectively and they contain a common angle, the angle *FAG*.

Therefore, the base *FC* is equal to the base *GB*, and the triangle *AFC* is equal to the triangle *AGB* and the remaining angles will be equal to the remaining angles, respectively, namely, those which the equal sides subtend, that is the angle *ACF* to the angle *ABG* and the angle *AFC* to the angle *AGB*.

And since the whole *AF* is equal to the whole *AG* and in these *AB* is equal to *AC*, the remainder *BF* is equal to the remainder *CG*.

But *FC* was also proved equal to *GB*; therefore, the two sides *BF*, *FC* are equal to the two sides *CG*, *GB*, respectively and the angle *BFC* is equal to the angle *CGB*, while the base *BC* is common to them; therefore, the triangle *BFC* is also equal to the triangle *CGB* and the remaining angles will be equal to the remaining angles, respectively, namely those which the equal sides subtend; therefore the angle *FBC* is equal to the angle *GCB* and the angle *BCF* to the angle *CBG*.

Accordingly, since the whole angle *ABG* was proved equal to the angle *ACF* and in these the angle *CBG* is equal to the angle *BCF*, the remaining angle *ABC* is equal to the remaining angle *ACB* and they are at the base of the triangle *ABC*.

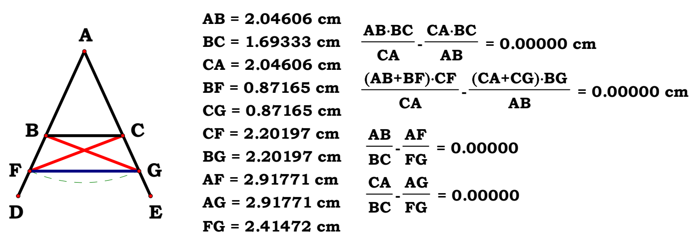
But the angle *FBC* was also proved equal to the angle *GCB* and they are under the base.

Therefore etc.

Which was to be demonstrated.

One could have simply produced *FG* from the start, however, that would have negated the idea of an angle under the base. But the lesson is still a bit short, as one has also introduced a method of constructing parallel lines and proving using a better graphic than the one currently in its place for demonstrations concerning parallels.

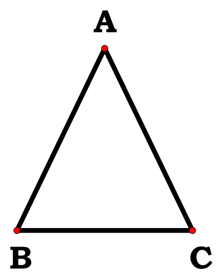
If (AB × BC)/AC = (AC × BC)/AB and BF = CG, then ((AB + BF) × CF)/AC = ((AC + CG) × BG)/AC because (BF × BC)/ CF= (CG × BC)/BG, etc. A lesson in proportion.



Proposition 6. Trying to Beat the System

In a definition, we equate a subject with its predicates, If we mention the definition but not the subject, does the demonstration in regard to that definition in any wise change? Can you prove a definition? Or are definitions standards for coincident behavior?

If, in a triangle, two angles are equal to one another, the sides which subtend the equal angles will also *be equal to one another.*

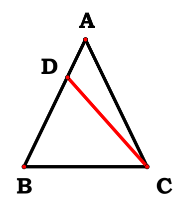


Construct triangle *ABC* having the angle *ABC* equal, to the angle *ACB*.

You have said that the side *AB* is also equal to the side *AC*.

For, if *AB* is unequal to *AC*, then one of them is greater.

Let *AB* be greater; and let from *AB* the greater *DB* asserted equal to *AC*, the less; join *DC*.



Then, since *DB* is equal to *AC* and *BC* is common, the two sides *DB*, *BC* are equal to the two sides *AC*, *CB* respectively; and the angle *DBC* is equal to the angle *ACB*; therefore, the base *DC* is equal to the base *AB* and the triangle *DBC* will be equal to the triangle *ACB* the less to the greater: which is absurd.

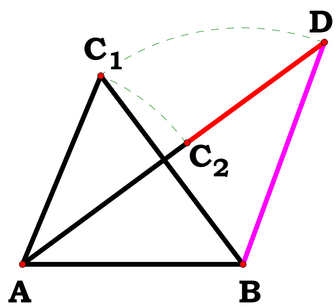
Therefore, *AB* is not unequal to *AC*; therefore, it is equal to it.

Therefore etc.

AB : BC :: AC : BC. ∴ AB = AC. AB is to BC as AC is to BC, therefore, AB equals AC.

Proposition 7. Trying to Beat the System, Again

Constructed on a segment and meeting in a point there cannot be constructed on the same segment and on the same side of it, two other segments meeting in another point and equal to the former two respectively, namely each to that which has the same extremity with it.



Construct, if possible, segments *AC*, *CB* constructed on the segment *AB* and meeting at the point *C* and then construct two other segments *AD*, *DB* with the same base *AB* and on the same side of it, meeting in another point *D* and equal to the former two segments *AC*, *CB* respectively. Describe *CD*.

Then, since *AC* is equal to *AD*, the angle *ACD* is also equal to the angle *ADC*; therefore the angle *ADC* is greater than the angle *DCB*; therefore the angle *CDB* is much greater than the angle DCB.

Again, since *CB* is equal to *DB*, the angle *CDB* is also equal to the angle *DCB*.

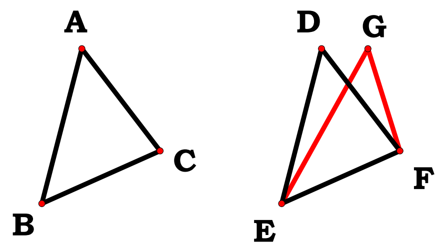
But it was also proved much greater than it: which is impossible.

If therefore etc.

CA/CB = X×AB. Y/CB = X×AB. ∴ Y = CB.

Proposition 8. And Again

If two triangles have the two sides equal, to two sides respectively, and have, also, *the base equal, to the base, they will*, also, *have the angles equal which are contained by the equal segments.*



Construct *ABC*, *DEF* as two triangles having the two sides *AB*, *AC* equal to the two sides *DE*, *DF*, respectively, namely *AB* to *DE* and *AC* to *DF* and let them have the base *BC* equal to the base *EF*.

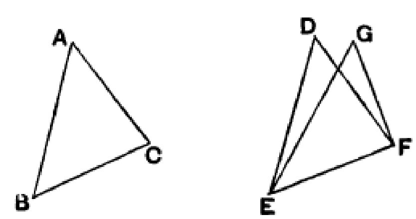
You have said that the angle *BAC* is also equal to the angle *EDF*.

For, if the triangle *ABC* be applied to the triangle *DEF* and if the point *B* be placed on the point *E* and the segment *BC* on *EF* the point *C* will also coincide with *F* because *BC* is equal to *EF*.

Then, *BC* coinciding with *EF*, *BA*, *AC* will also coincide with *ED*, *DF*; for, if the base *BC* coincides with the base *EF* and the sides *BA*, *AC* do not coincide with *ED*, *DF* but fall beside them as *EG*, *GF*, then given two segments constructed with a segment (from its extremities), and meeting in a point, there will have been constructed with the same segment (from its extremities), and on the same side of it, two other segments meeting in another point, and equal, to the former two, respectively, namely, each to that which has the same extremity with it.

But, they cannot be so constructed.

Therefore, it is not possible that if the base *BC* be applied to the base *EF* the sides *BA*, *AC* should not coincide with *ED*, *DF*; therefore, they will coincide so that the angle *BAC* will also coincide with the angle *EDF* and will be equal to it.



If therefore etc., which was to be demonstrated.

AB = DE. BC = EF. AC = DF.

AB/BC = AB/EF = DE/EF = DE/BC.

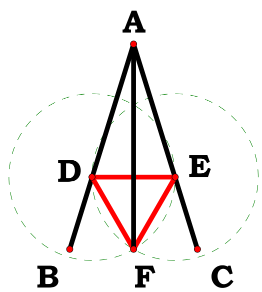
BC/AC = BC/DF = EF/DF = EF/AC.

AC/AB = AC/DE = DF/EF = DF/AB. etc.

Proposition 9. Angle Bisection

Many people divorce the two sides and vertices from the segment which they are equated to for showing how a geometric ratio is turned into an arithmetic judgment. Proposition 9 will speak in terms of the angle, while 10 in terms of the segment. Yet, the exact same thing is done to denote how to divide both.

Angle bisection.



Construct the angle *BAC*.

Thus it is required to bisect it.

Take a point *D* at random on *AB*. Construct *AE* equal to *AD*.

Describe *DE* and with *DE*. Construct the equilateral triangle *DEF*. Describe AF.

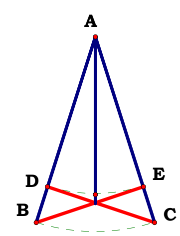
You have said that the angle *BAC* has been bisected by the segment *AF*.

For, since *AD* is equal to *AE* and *AF* is common, the two sides *DA*, *AF* are equal to the two sides *EA*, *AF*, respectively.

And, the base *DF* is equal to the base *EF*; therefore the angle *DAF* is equal to the angle *EAF*.

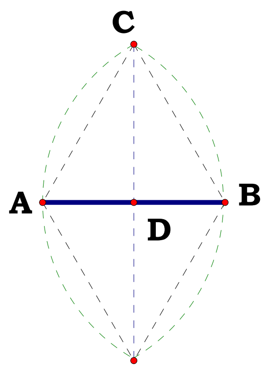
Therefore, the given rectilineal angle *BAC* has been bisected by the segment *AF*.

Which was to be done.



When comparing two angles, you have to construct a triangle which will produce exactly the same unit for all three angles, i.e. the circle which circumscribes the triangle. In short, you are given a universal and you construct particular examples of it to learn it.

Proposition 10. Linear Bisection



Segment bisection.

Bisection means to divide a thing into two equal parts,

Construct the segment *AB*.

Thus it is required to bisect this segment *AB*.

Construct the equilateral triangle *ABC* and bisect the angle *ACB* with the segment *CD*;

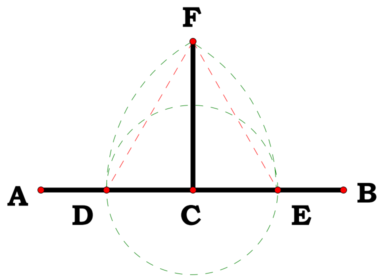
You have said that the segment *AB* has been bisected at the point *D*.

For, since *AC* is equal to *CB* and *CD* is common, the two sides *AC*, *CD* are equal to the two sides *BC*, *CD*, respectively; and the angle *ACD* is equal to the angle *BCD*; therefore, the base *AD* is equal to the base *BD*.

Therefore, the given segment *AB* has been bisected at *D* which was to be done.

Proposition 11. Perpendicular On a Line

Draw a segment at right angles to, or again *perpendicular*, *to a line from any point on it*.



Construct *AB* as a line and assert *C* as a point on it.

Thus it is required to draw from the point *C* a segment at right angles to the line *AB*.

Take a point *D* at random on *AC* and construct the circle CD, *CE* is equal to *CD*; Construct the equilateral triangle *FDE* with *DE*. Describe *FC*.

You have said that the segment *FC* is at right angles to the segment *AB* at *C*.

For, since *DC* is equal to *CE* and *CF* is common, the two sides *DC*, *CF* are equal to the two sides *EC*, *CF* respectively and the base *DF* is equal to the base *FE*; therefore, the angle *DCF* is equal to the angle *ECF* and they are adjacent angles.

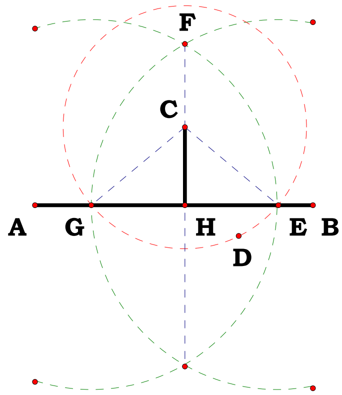
But, when a segment is constructed on a segment makes the adjacent angles equal to one another, each of the equal angles is right; therefore, each of the angles *DCF*, *FCE* is right.

Therefore, the segment *CF*, has been drawn at right angles to the line *AB* from any asserted point *C*.

Which was to be done.

Proposition 12. Perpendicular To a Line

Construct on a line and from any point which is not on it a perpendicular.



Construct a line *AB* and a point *C* which is not on it; thus it is required to draw a perpendicular line to *AB* from the point *C*.

At random assert a point *D* on the other side of the line *AB*, and with center *C* and segment *CD*, let the circle *CD* be described;

Let the segment *EG* produced by circle *CD* be bisected at *H* and let segments *CG*, *CH*, *CE*, be described.

You have said that *CH* has been drawn perpendicular to the line *AB* from the point *C* which is not on it.

For, since *GH* is equal to *HE* and *HC* is common, the two sides *GH*, *HC* are equal to the two sides *EH*, *HC* respectively; and the base *CG* is equal to the base *CE*;

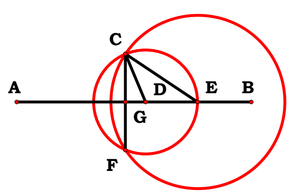
Therefore, the angle *CHG* is equal to the angle *EHC*.

And they are adjacent angles.

But when a segment is set up on a segment makes the adjacent angles equal to one another, each of the equal angles is right and those segments are called perpendicular to each other.

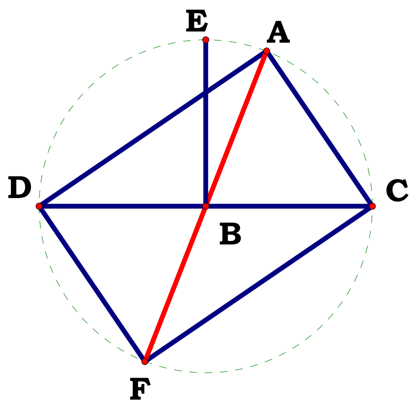
Therefore, *CH* has been drawn perpendicular to the line *AB* from a point *C* which is not on it.

Which was to be done.



Alternative.

Proposition 13. Adding Angles



If a segment is set up on a segment make angles, it will make either two right angles or angles equal to two right angles.

Construct any segment *AB* on the segment *CD* making the angles *CBA* and *ABD*;

You have said that the angles *CBA*, *ABD* are either two right angles or equal to two right angles.

Now, if the angle *CBA* is equal to the angle *ABD* then they are two right angles.

But, if not, Construct *BE* from the point *B* at right angles to *CD*; therefore the angles *CBE*, *EBD* are two right angles.

Then, since the angle *CBE* is equal to the two angles *CBA*, *ABE* add the angle *EBD* to both.

Therefore, the angles *CBE*, *EBD* are equal to the three angles *CBA*, *ABE*, *EBD*.

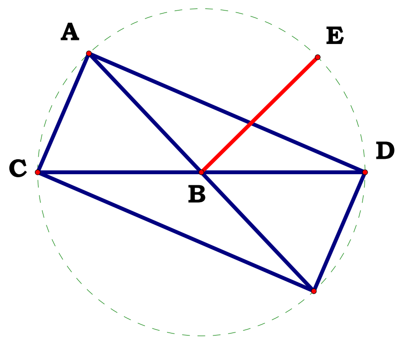
Again, since the angle *DBA* is equal to the two angles *DBE*, *EBA* add angle *ABC* to them; therefore, the angles *DBA*, *ABC* are equal to the three angles *DBE*, *EBA*, *ABC*.

But the angles *CBE*, *EBD* were also proved equal to the same three angles; and things which are equal, to the same thing are also equal, to one another; therefore, the angles *CBE*, *EBD* are also equal to the angles *DBA*, *ABC*. But, the angles *CBE*, *EBD* are two right angles; therefore, the angles *DBA*, *ABC* are also equal to two right angles.

Therefore etc., which was to be demonstrated.

Proposition 14. Collinear by Angle

And from the previous graphic, we can see that this is true, but again, this graphic is deficient.



If with any segment and at a point on it, two segments not lying on the same side make the adjacent angles equal to two right angles, the two segments will be collinear with one another.

Construct any segment *AB* and at the point *B*, and also the two segments *BC*, *BD*, one to the left of *B* and one to the right. Then the adjacent angles *ABC*, *ABD* are equal to two right angles;

You have said that *BD* added to the segment *CB* equals the segment *CD*.

For if *BD* added to *BC* does not equal *CD*, let any *BE* added to *CB* equal CD.

Then, since the segment *AB* stands on the segment *CBE*, the angles *ABC*, *ABE* are equal to two right angles.

But the angles *ABC*, *ABD* are also equal to two right angles; therefore, the angles *CBA*, *ABE* are equal to the angles *CBA*, *ABD*.

Let, the angle *CBA* be subtracted from them; therefore, the remaining angle *ABE* is equal to the remaining angle *ABD*, the less to the greater, which is impossible.

Therefore, *BE* is not collinear with *CB*.

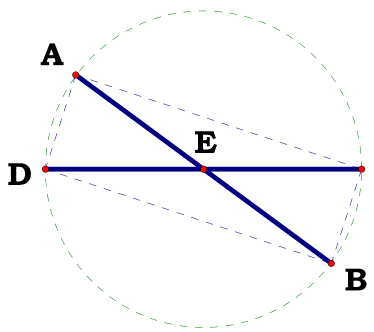
Similarly, we can prove that neither is any other segment except *BD*.

Therefore, *CB* is collinear with *BD*. Therefore etc.

Which was to be demonstrated.

Proposition 15. Vertical Angles

If two segments intersect one another, they make the vertical angles equal to one another.



Construct the segments *AB*, *CD* intersecting each other at the point *E*.

You have said that the angle *AEC* is equal to the angle *DEB* and the angle *CEB* to the angle *AED*.

For, since segment *AE* intersecting *CD* makes the angles *CEA*, *AED* and the angles *CEA*, *AED* are equal to two right angles.

Again, since segment *DE* stands on the segment *AB* makes the angles *AED*, *DEB* the angles *AED*, *DEB* are equal to two right angles. But, the angles *CEA*, *AED* were also proved equal to two right angles; therefore, the angles *CEA*, *AED* are equal to the angles *AED*, *DEB*.

Let, the angle *AED* be subtracted from each; therefore the remaining angle *CEA* is equal to the remaining angle *BED*.

Similarly, it can be proved that the angles *CEB*, *DEA* are also equal.

Therefore etc.

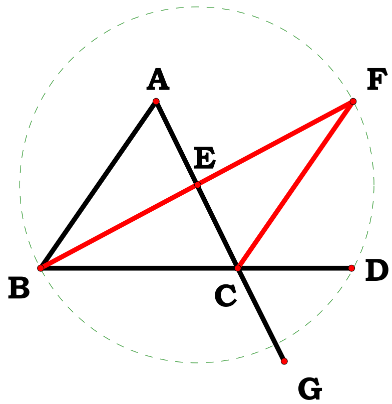
Which was to be demonstrated.

[Porism.

From this it is manifest that, if two segments intersect one another, they will make the angles at the point of intersection equal, to four right angles. Or in short, there is no fender damage to intersecting segments.]

Proposition 16. Exterior Angles

In any triangle, if one of the sides be produced, the exterior angle is greater than either of the interior and opposite angles.



Construct triangle *ABC* and let, one side of it, *BC* produced to *D*;

You have said that the exterior angle *ACD* is greater than either of the interior and opposite angles *CBA*, *BAC*.

And here is how. Bisect *AC* at *E* and describe *BE* to *F*.

Construct *EF* equal to *BE* and describe *FC*. Draw *AC* through to *G*.

Then, since *AE* is equal to *EC* and *BE* to *EF*, the two sides *AE*, *EB* are equal to the two sides *CE*, *EF*, respectively; and the angle *AEB* is equal to the angle *FEC* for they are vertical angles.

Therefore, the base *AB* is equal to the base *FC* and the triangle *ABE* is equal to the triangle *CFE*, and the remaining angles are equal to the remaining angles respectively, namely, those which the equal sides subtend.

Therefore, the angle *BAE* is equal to the angle *ECF*.

But, the angle *ECD* is greater than the angle *ECF*; therefore, the angle *ACD* is greater than the angle *BAE*.

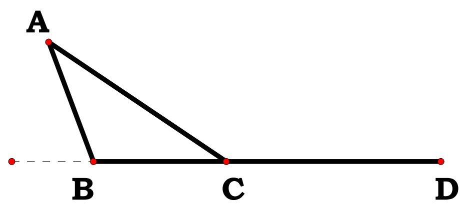
Similarly also, if *BC* be bisected the angle *BCG* that is the angle *ACD* can be proved greater than the angle *ABC* as well.

Therefore etc.

Which was to be demonstrated.

Proposition 17. Sum of Two Angles in a Triangle

What is being said is not perceptible, it is intelligible. What is being said is that a triangle is equal to some unit. Down the road, one will learn that unit is the radius of a circle. Arithmetically, every segment is some one unit.



In any triangle, two angles taken together in any manner are less than two right angles.

Construct the triangle *ABC*;

You have said that two angles of the triangle *ABC* taken together in any manner are less than two right angles, as you have learnt from the preceding examinations.

For let *BC* be produced to *D*.

Then, since, the angle *ACD* is an exterior angle of the triangle *ABC*, it is greater than the interior and opposite angle *ABC*.

Add the angle *ACB* to each; therefore, the angles *ACD*, *ACB* are greater than the angles *ABC*, *BCA*.

But the angles *ACD*, *ACB* are equal to two right angles.

Therefore, the angles *ABC*, *BCA* are less than two right angles.

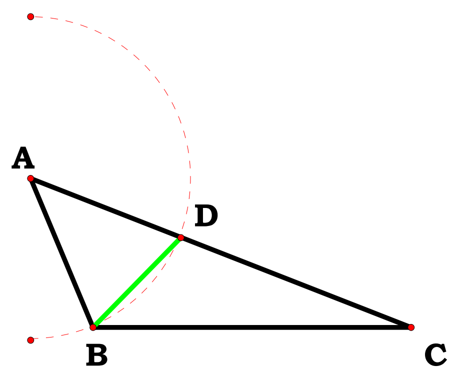
Similarly we can prove also that the angles *BAC*, *ACB* are less than two right angles, and so are the angles *CAB*, *ABC* as well.

Therefore etc.

Which was to be demonstrated.

Proposition 18. Greater Angles Greater Side

In short, greater and less, in regard to an angle, is implied in the very definition of an angle itself, and therefore, to compare angles, as demonstrated above, one has to complete the triangle.



In any triangle the greater side subtends the greater angle.

Construct the triangle *ABC* having the side *AC* greater than *AB*;

You have said that the angle *ABC* is also greater than the angle *BCA*.

For, since *AC* is greater than *AB* construct *AD* equal to *AB* and describe *BD*.

Then, since the angle *ADB* is an exterior angle of the triangle *BCD* it is greater than the interior and opposite angle *DCB*.

But, the angle *ADB* is equal to the angle *ABD*, since the side *AB* is equal to *AD*; therefore, the angle *ABD* is also greater than the angle *ACB*;

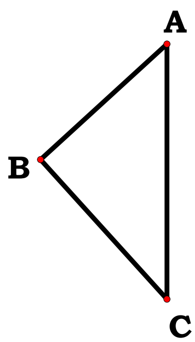
Therefore, the angle *ABC* is much greater than the angle *ACB*.

Therefore etc.

Which was to be demonstrated.

Proposition 19. Greater Side Greater Angle

And we stress the definition from both perspectives.



In any triangle the greater angle is subtended by the greater side.

Construct a triangle *ABC* having the angle *ABC* greater than the angle *BCA*;

You have said that the side *AC* is also greater than the side *AB*.

For, if not, *AC* is either equal to *AB* or less.

Now, *AC* is not equal to *AB*; for then the angle *ABC* would also have been equal to the angle *ACB*; but it is not;

Therefore, *AC* is not equal to *AB*. Neither is *AC* less than *AB*, for then the angle *ABC* would also have been less than the angle *ACB*, but it is not;

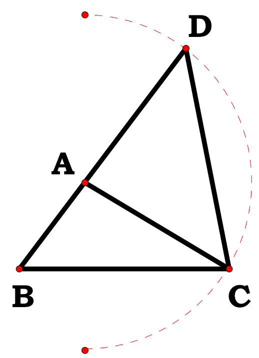
Therefore, *AC* is not less than *AB*. And it was proved that it is not equal either. Therefore, *AC* is greater than *AB*.

Therefore etc.

Which was to be demonstrated.

Proposition 20. Sum of Sides of a Triangle

In any triangle two sides taken together in any manner are greater than the remaining one.



Construct a triangle *ABC*;

You have said that in the triangle *ABC* two sides taken together in any manner are greater than the remaining one namely, *BA*, *AC* greater than *BC*, *AB*, *BC* greater than *AC*, *BC*, *CA* greater than *AB*.

Draw *BA* through to the point *D* and construct *DA* equal to *CA* and describe *DC*.

Then, since *DA* is equal to *AC*, the angle *ADC* is also equal to the angle *ACD*; therefore, the angle *BCD* is greater than the angle *ADC*.

And, since *DCB* is a triangle having the angle *BCD* greater than the angle *BDC*, and the greater angle is subtended by the greater side, therefore, *DB* is greater than *BC*.

But, *DA* is equal to *AC*; therefore, *BA*, *AC* are greater than *BC*.

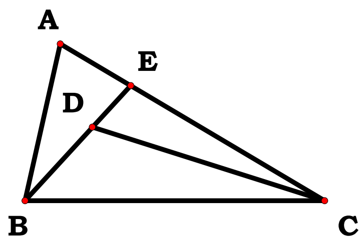
Similarly, also we can prove that *AB*, *BC* are greater than *CA*, and *BC*, *CA* than *AB*.

Therefore etc.

Which was to be demonstrated.

Proposition 21. Length of Sides, In and Out

If on one of the sides of a triangle, from its extremities, there be constructed two segments meeting within the triangle, the segments so constructed will be less than the remaining two sides of the triangle, but will contain a greater angle.



Construct on *BC*, the triangle *ABC* and from its extremities *B*, *C*, construct the two segments *BD*, *DC* meeting within the triangle;

You have said that *BD*, *DC* are less than the remaining two sides of the triangle *BA*, *AC* but contain an angle *BDC* greater than the angle *BAC*.

For draw *BD* to *E*. Then, since, in any triangle two sides are greater than the remaining one, therefore, in the triangle *ABE*, the two sides *AB*, *AE* are greater than *BE*.

Add *EC* to each; therefore *BA*, *AC* are greater than *BE*, *EC*.

Again, since in the triangle *CED* the two sides *CE*, *ED* are greater than *CD*, add *DB* to each; therefore, *CE*, *EB* are greater than *CD*, *DB*.

But *BA*, *AC* were proved greater than *BE*, *EC*; therefore, *BA*, *AC* are much greater than *BD*, *DC*.

Again, since, in any triangle, the exterior angle is greater than the interior and opposite angle, therefore in the triangle *CDE* the exterior angle *BDC* is greater than the angle *CED*.

For the same reason, moreover, in the triangle *ABE*, also the exterior angle *CEB* is greater than the angle *BAC*.

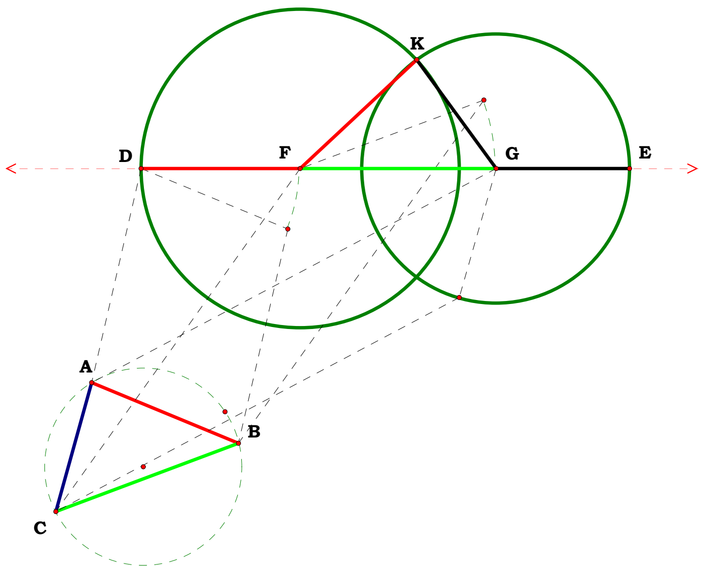
But, the angle *BDC* was proved greater than the angle *CEB*; therefore, the angle *BDC* is much greater than the angle *BAC*.

Therefore etc.

Which was to be demonstrated.

Proposition 22. Copy a Triangle Using Sides

The idea is very simple here. You are going to lay the three segments out flat, then fold the extreme segments over the middle one to make your house.



Copy a triangle to another line.

Construct any circle and place on the circumference any three points and describe with them triangle *ABC*.

Thus it is required, to duplicate that triangle out of segments equal to *AB, BC, and AC*.

Construct line *DE* and make *DF* equal to *AB*, and *FG* equal to *BC*, and *GH* equal to *AC*.

Now fold it up: With center *F* and segment *FD*, describe the circle *FD;*

Again with center *G* and segment *GH*, describe the circle *GH*.

Name the intersection *K* and describe *KF*, and *KG*;

You have now said that the triangle *KFG*, has been constructed, using segments equal to *ABC*.

For, since the point *F* is the center of the circle *DF*, *FD* is equal to *FK*.

But, *FD* is equal to *AB*; therefore *KF* is also equal to *AB*.

Again, since the point *G* is the center of the circle *LKH*, *GH* is equal to *GK*.

But, *GH* is equal to *C*; therefore *KG* is also, equal to *C*.

And, *FG* is also equal to *B*; therefore the three segments *KF*, *FG*, *GK*, are equal to the three segments *A*, *B*, *C*.

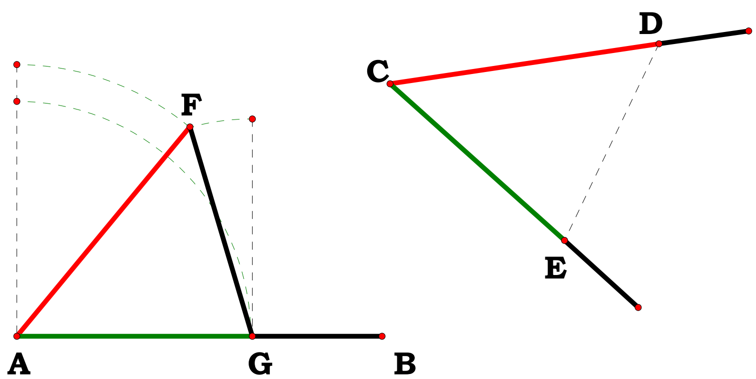
Therefore, out of the three segments *KF*, *FG*, *GK* which are equal to the three given segments *A*, *B*, *C*, the triangle *KFG*, has been constructed.

Which was to be done.

Proposition 23. Copy an Angle

The angle exhibits natural proof of implication. Implication is simply this, given such and such information, compute the entire thing, or again, an example that a syllogism is not something which is wholly imagined, we learn it by example, just as the angle. Now you know the meaning of the question, what is your angle? Here we are doing exactly what was just done above, just changing how we say something. Given three lines or two lines and an angle. The real difference is that we are going to be doing this very same thing proportionally. Thus, if I speak about a triangle, I am speaking arithmetically, If I am speaking about an angle, I can be speaking proportionally. In short, one is learning that trigonometry is not part of geometry because geometry teaches one how to compute without the mysticism and bs.

On a line and at a point on it construct an angle equal to another angle.



Construct line *AB* and *A* the point on it, and, also construct by itself the angle *DCE*; thus it is required, to construct on the line, *AB*, and, at the point, *A*, on it, an angle equal to *DCE*.

Notice that when told to construct the angle, nothing was said about how long to make the legs of it, now at random, assert of the lines *CD*, *CE*, the points, *D*, *E*; respectively let, *DE* be described, and, out of three segments, which are equal, to the three segments *CD*, *DE*, *CE,* construct the triangle, *AFG*, in such a way, that *CD* is equal to *AF*, *CE* to *AG*, and further, *DE* to *FG*.

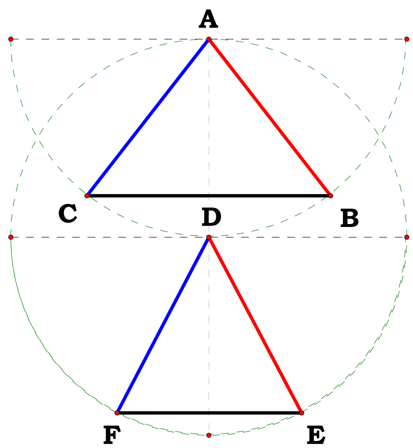
Then, since, the two sides, *DC*, *CE*, are equal to the two sides *FA*, *AG,* respectively, and the base *DE* is equal to the base *FG*, the angle *DCE* is equal to the angle *FAG*, therefore, on the line *AB* and at the point *A* on it, the angle *FAG* has been constructed equal to the given angle *DCE*.

Which was to be done.

Proposition 24. Greater Side Greater Angle for Equilaterals

Sometimes, when you read one of these propositions, you realize that the given graphic is definitely not up to snuff. One should acquire their standard for an analog demonstration from the definitions given if required, and here it is required.

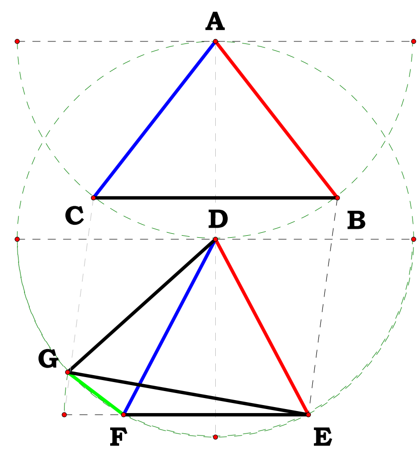
If two triangles have the two sides equal to two sides respectively, but have the one of the angles contained by the equal straight lines greater than the other, they will also *have the base greater than the base.*



Construct *ABC*, *DEF* as two triangles having the two sides *AB*, *AC* equal to the two sides *DE*, *DF* respectively, namely *AB* to *DE*, and *AC* to *DF*, and construct the angle at *A* as greater than the angle at *D*;

You have said that the base *BC* is also greater than the base *EF*.

For, since the angle *BAC* is greater than the angle *EDF*, construct on the line *DE* at the point *D* on it, the angle *EDG* equal to the angle *BAC*;



Construct *DG* equal to either of the two segments *AC*, *DF*, and describe *EG*, *FG*.

Then, since *AB* is equal to *DE* and *AC* to *DG*, the two sides *BA*, *AC* are equal to the two sides *ED*, *DG*, respectively; and the angle *BAC* is equal to the angle *EDG*; therefore, the base *BC* is equal to the base *EG*.

Again, since *DF* is equal to *DG*, the angle *DGF* is also equal to the angle *DFG*; therefore, the angle *DFG* is greater than the angle *EGF*.

Therefore, the angle *EFG* is much greater than the angle *EGF*.

And, since *EFG* is a triangle having the angle *EFG* greater than the angle *EGF* and the greater angle is subtended by the greater side, the side *EG* is also greater than *EF*.

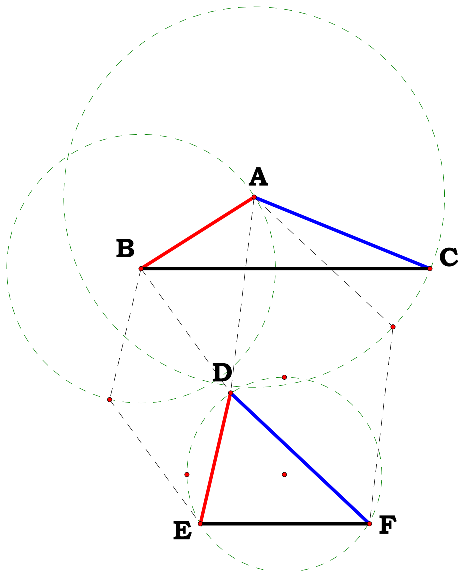
But, *EG* is equal to *BC*. Therefore *BC* is also, greater than *EF*.

Therefore etc.

Which was to be demonstrated.

Proposition 25. Greater and Lesser Bases

If two triangles have the two sides equal to two sides respectively, but have the base greater than the base, they will also *have the one of the angles contained by the equal straight lines greater than the other.*



Construct *ABC*, *DEF*, as two triangles having the two sides, *AB*, *AC*, equal, to the two sides, *DE*, *DF*, respectively, namely *AB* to *DE*, and *AC* to *DF*; and construct the base *BC* as greater than the base *EF*.

You have said that the angle *BAC* is also greater than the angle *EDF*.

If you deny it, then it is either equal to it or less.

Now, the angle *BAC* is not equal to the angle *EDF*; for then the base *BC* would also, have been equal to the base *EF*, but it is not; therefore the angle *BAC* is not equal to the angle *EDF*.

Again, neither is the angle *BAC* less than the angle *EDF*; for then the base *BC* would also have been less than the base *EF*, but it is not; therefore, the angle *BAC* is not less than the angle *EDF*.

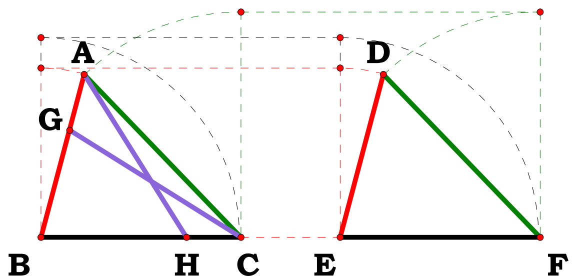
But, it was proved that it is not equal either; therefore, the angle *BAC* is greater than the angle *EDF*.

Therefore etc.

Which was to be demonstrated.

Proposition 26. Angle Side Angle Equality

If two triangles have the two angles equal to two angles respectively, and one side equal to one side, namely, either the side adjoining the equal angles or that subtending one of the equal angles, they will also *have the remaining sides equal to the remaining sides and the remaining angle to the remaining angle.*



Construct *ABC*, *DEF*, as two triangles having the two angles *ABC*, *BCA* equal, to the two angles *DEF*, *EFD*, respectively, namely, the angle *ABC* to the angle *DEF* and the angle *BCA* to the angle *EFD*; and let them also have one side equal to one side, first that adjoining the equal angles namely *BC* to *EF*;

You have said that they will also have the remaining sides equal to the remaining sides, respectively, namely *AB* to *DE* and *AC* to *DF*, and the remaining angle to the remaining angle namely the angle *BAC* to the angle *EDF*.

For, if *AB* is unequal to *DE*, one of them is greater. Let *AB* be greater and let *BG* be made equal to *DE*; and let *GC* be joined.

Then, since *BG* is equal to *DE* and *BC* to *EF*, the two sides *GB*, *BC* are equal to the two sides *DE*, *EF* respectively; and the angle *GBC* is equal to the angle *DEF*; therefore, the base *GC* is equal to the base *DF*, and the triangle *GBC* is equal to the triangle *DEF* and the remaining angles will be equal to the remaining angles, namely those which the equal sides subtend; therefore, the angle *GCB* is equal to the angle *DFE*.

But by hypothesis the angle *DFE* is equal to the angle *BCA*; therefore, the angle *BCG* is equal to the angle *BCA* the less to the greater: which is impossible.

Therefore, *AB* is not unequal to *DE* and therefore is equal to it.

But, *BC* is also equal to *EF*; therefore, the two sides *AB*, *BC* are equal to the two sides *DE*, *EF* respectively, and the angle *ABC* is equal to the angle *DEF*; therefore, the base *AC* is equal to the base *DF* and the remaining angle *BAC* is equal to the remaining angle *EDF*.

Again, let the sides subtending equal angles be equal as *AB* to *DE*;

You have said again that the remaining sides will be equal to the remaining sides, namely *AC* to *DF*, and *BC* to *EF*, and further, the remaining angle *BAC* is equal to the remaining angle *EDF*.

For, if *BC* is unequal to *EF*, then one of them is greater.

Let, if possible, *BC* be greater and let *BH* be made equal to *EF*; let *AH* be joined.

Then, since *BH* is equal to *EF*, and *AB* to *DE*, the two sides *AB*, *BH* are equal to the two sides *DE*, *EF*, respectively and they contain equal angles; therefore, the base *AH* is equal to the base *DF* and the triangle *ABH* is equal to the triangle *DEF* and the remaining angles will be equal to the remaining angles, namely those which the equal sides subtend; therefore, the angle *BHA* is equal to the angle *EFD*.

But, the angle *EFD* is equal to the angle *BCA*; therefore, in the triangle *AHC* the exterior angle *BHA* is equal to the interior and opposite angle *BCA*: which is impossible.

Therefore, *BC* is not unequal to *EF* and therefore is equal to it.

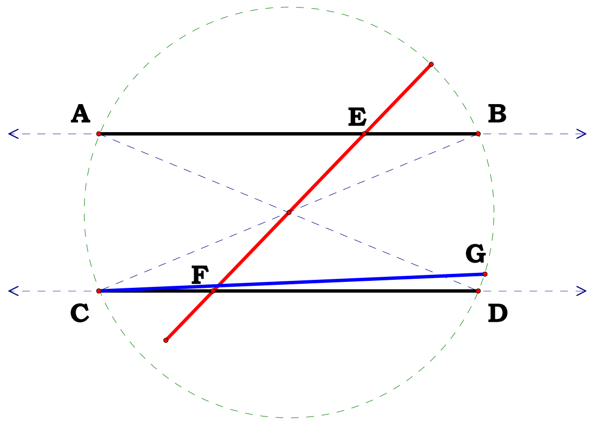
But, *AB* is also equal to *DE*; therefore, the two sides *AB*, *BC* are equal to the two sides *DE*, *EF* respectively, and they contain equal angles; therefore, the base *AC* is equal to the base *DF* the triangle *ABC* equal to the triangle *DEF* and the remaining angle *BAC* equal to the remaining angle *EDF*.

Therefore etc.

Which was to be demonstrated.

Proposition 27. Parallel and Inclined

It appears that whoever drew this infantile graphic forgot how to draw a perpendicular to demonstrate the figure in accordance with what has already been given.



If a segment intersects two lines make the alternate angles equal to one another, the lines will be parallel to one another.

Construct, the segment *EF*, intersecting the lines, *AB*, *CD*, which make the alternate angles *AEF*, *EFD* equal to one another;

You have said that *AB* is parallel to *CD*.

For, if not, then *AB*, *CD* when produced will meet either in the direction of *B*, *D*, or towards *A*, *C*.

Let, them be produced and meet in the direction of *B*, *D* at *G*.

Then, in the triangle *GEF* the exterior angle *AEF* is equal to the interior and opposite angle *EFG*: which is impossible.

Therefore *AB*, *CD* when produced will not meet in the direction of *B*, *D*.

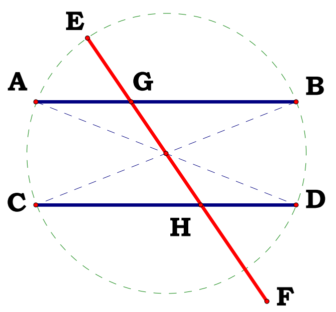
Similarly it can be proved that, neither will they meet towards *A*, *C*.

But straight lines which do not meet in either direction are parallel; therefore *AB* is parallel to *CD*. Therefore etc.

Which was to be demonstrated.

Proposition 28. Parallel and Inclined Again

If a segment intersects two lines make the exterior angle equal, to the interior and opposite angle on the same side, or the interior angles on the same side equal to two right angles, the lines will be parallel to one another.



Construct the segment *EF*, intersecting the two lines *AB*, *CD* making the exterior angle *EGB* equal to the interior and opposite angle *GHD* or the interior angles on the same side namely *BGH*, *GHD*, equal, to two right angles;

You have said that *AB* is parallel to *CD*.

For, since the angle *EGB* is equal to the angle *GHD*, while the angle *EGB* is equal to the angle *AGH*, the angle *AGH* is also equal to the angle *GHD*; and they are alternate; therefore, *AB* is parallel to *CD*.

Again, since the angles *BGH*, *GHD* are equal to two right angles and the angles *AGH*, *BGH* are also equal to two right angles, the angles *AGH* *BGH* are equal to the angles *BGH*, *GHD*.

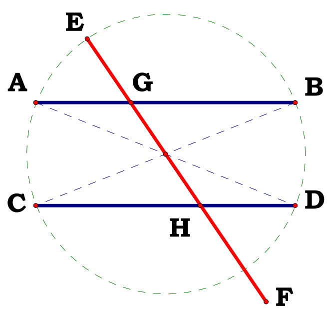
Let, the angle *BGH* be subtracted from each; therefore, the remaining angle *AGH* is equal to the remaining angle *GHD*; and they are alternate; therefore, *AB* is parallel to *CD*.

Therefore etc.

Which was to be demonstrated.

Proposition 29. Parallel Lines Interior and Exterior Angles

A segment intersecting parallel lines makes the alternate angles equal to one another, the exterior angle equal to the interior and opposite angle, and the interior angles on the same side equal to two right angles.



Construct the segment *EF* intersecting the parallel lines *AB*, *CD*;

You have said that it makes the alternate angles *AGH*, *GHD* equal the exterior angle *EGB* equal to the interior and opposite angle *GHD* and the interior angles on the same side, namely *BGH*, *GHD*, equal to two right angles.

For, if the angle *AGH* is unequal to the angle *GHD* one of them is greater.

Let, the angle *AGH* be greater.

Let, the angle *BGH* be added to each; therefore, the angles *AGH*, *BGH* are greater than the angles *BGH*, *GHD*.

But the angles *AGH*, *BGH* are equal to two right angles; therefore, the angles *BGH*, *GHD* are less than two right angles.

But, lines produced indefinitely from angles less than two right angles intersect; therefore *AB*, *CD*, if produced indefinitely, will intersect; but, they do not intersect because by hypothesis they are parallel.

Therefore, the angle *AGH* is not unequal to the angle *GHD* and therefore is equal to it.

Again, the angle *AGH* is equal to the angle *EGB*; therefore, the angle *EGB* is also equal to the angle *GHD*.

Let, the angle *BGH* be added to each; therefore, the angles *EGB*, *BGH* are equal to the angles *BGH*, *GHD*.

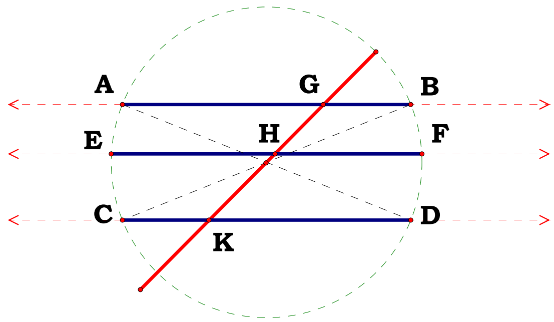
But, the angles *EGB*, *BGH* are equal to two right angles; therefore, the angles *BGH*, *GHD* are also equal to two right angles.

Therefore etc.

Which was to be demonstrated.

Proposition 30. Recursion of Parallels

Lines parallel to the same line are also *parallel to one another*.



Construct each of the lines *AB*, *CD* as parallel to *EF*;

You have said that *AB* is also parallel to *CD*.

For construct the segment *GK* intersecting them.

Then, since the segment *GK* is intersecting the parallel lines *AB*, *EF* the angle *AGK* is equal to the angle *GHF*.

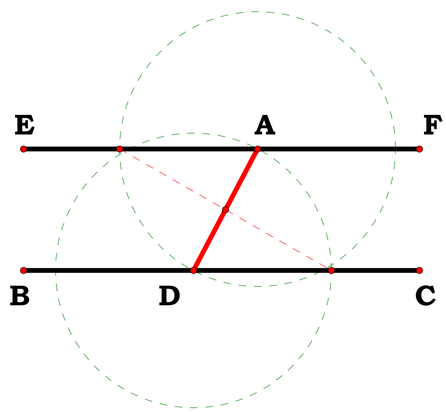
Again, since the segment *GK* has intersected the parallel lines *EF*, *CD* the angle *GHF* is equal to the angle *GKD*.

But the angle *AGK* was also proved equal to the angle *GHF*; therefore, the angle *AGK* is also equal to the angle *GKD*; and they are alternate.

Therefore, *AB* is parallel to *CD*. Which was to be demonstrated.

Proposition 31. Construct A Parallel from a Point

Through a *point draw a line parallel to* a *line.*



Construct the point *A*, and the segment *BC*; thus it is required to draw through the point *A*, a line parallel to the segment *BC*.

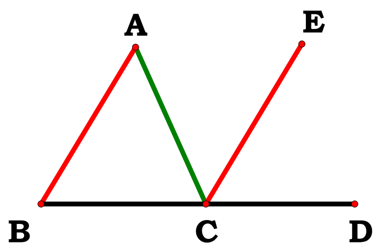
Construct on *BC* any point *D* and describe *AD*; let, construct on *DA* and at the point *A* the angle *DAE* equal to the angle *ADC* and produce *AF* inline with *EA*.

Then, the line *AD* intersects the two segments *BC*, *EF* making the alternate angles *EAD*, *ADC* equal to one another.

Therefore, *EAF* is parallel to *BC,* therefore, through a point *A* and parallel to the segment *BC* the segment *EAF* has been drawn which was to be done.

Proposition 32. The Exterior Angle

*In any triangle, if one of the sides be produced, the exterior angle is equal to the two interior and opposite angles and the three interior angles of the triangle are equal to two right angle*s.



Construct *ABC* as a triangle and produce one side of it *BC* to *D*;

You have said that the exterior angle *ACD* is equal to the two interior and opposite angles *CAB*, *ABC* and the three interior angles of the triangle *ABC*, *BCA*, *CAB* are equal to two right angles.

For let *CE* be drawn through the point *C* parallel to the segment *AB*.

Then, since *AB* is parallel to *CE* and *AC* intersects them, the alternate angles *BAC*, *ACE* are equal to one another.

Again, since *AB* is parallel to *CE* and the segment *BD* intersects them, the exterior angle *ECD* is equal to the interior and opposite angle *ABC*.

But the angle *ACE* was also, proved equal to the angle *BAC*; therefore, the whole angle *ACD* is equal to the two interior and opposite angles *BAC*, *ABC*.

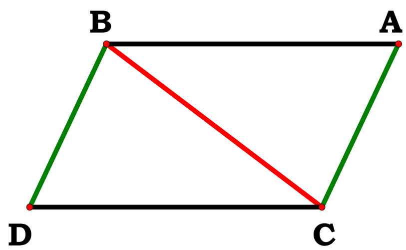
Let the angle *ACB* be added to each; therefore, the angles *ACD*, *ACB* are equal to the three angles *ABC*, *BCA*, *CAB*.

But the angles *ACD*, *ACB* are equal to two right angles; therefore, the angles *ABC*, *BCA*, *CAB* are also equal to two right angles.

Therefore etc., which was to be demonstrated.

Proposition 33. Parallel Segments

The segments joining equal and parallel segments in the same directions are themselves also *equal and parallel.*



Construct *AB*, *CD* as equal and parallel, and construct the segments *AC*, *BD*. Describe them in the respective directions.

You have said that *AC* and *BD* are also equal and parallel.

Join *BC*. Then, since *AB* is parallel to *CD* and *BC* has intersected them, the alternate angles *ABC*, *BCD* are equal to one another.

And, since *AB* is equal to *CD* and *BC* is common, the two sides *AB*, *BC* are equal to the two sides *DC*, *CB*; and the angle *ABC* is equal to the angle *BCD*; therefore, the base *AC* is equal to the base *BD* and the triangle *ABC* is equal to the triangle *DCB* and the remaining angles will be equal to the remaining angles, respectively those which the equal sides subtend; therefore the angle *ACB* is equal to the angle *CBD*.

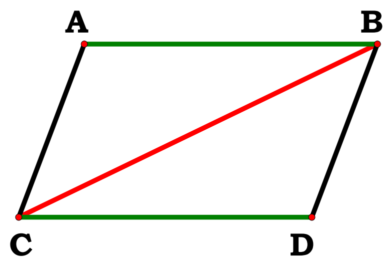
And, since the segment *BC*, the two segments *AC*, *BD* have made the alternate angles equal to one another, *AC* is parallel to *BD*.

And it was also proved equal to it.

Therefore etc., which was to be demonstrated.

Proposition 34. Parallelogrammic Areas

In parallelogrammic areas the opposite sides and angles are equal to one another and the diameter bisects the areas.



Construct *ACDB* as a parallelogrammic area and *BC* its diameter. You have said that the opposite sides and angles of the parallelogram *ACDB* are equal to one another and the diameter *BC* bisects it.

For, since *AB* is parallel to *CD* and the segment *BC* intersects them, the alternate angles *ABC*, *BCD*, are equal to one another.

Again, since *AC* is parallel to *BD* and *BC* intersects them, the alternate angles *ACB*, *CBD* are equal to one another.

Therefore, *ABC*, *DCB* are two triangles having the two angles *ABC*, *BCA* equal to the two angles *DCB*, *CBD* respectively, and one side equal to one side, namely that adjoining the equal angles and common to both of them *BC*; therefore, they will also have the remaining sides equal to the remaining sides respectively, and the remaining angle to the remaining angle; therefore, the side *AB* is equal to *CD* and *AC* to *BD* and further the angle *BAC* is equal to the angle *CDB*.

And, since the angle *ABC* is equal to the angle *BCD* and the angle *CBD* to the angle *ACB*, the whole angle *ABD* is equal to the whole angle *ACD*.

And, the angle *BAC* was also proved equal to the angle *CDB*.

Therefore, in parallelogrammic areas the opposite sides and angles are equal to one another.

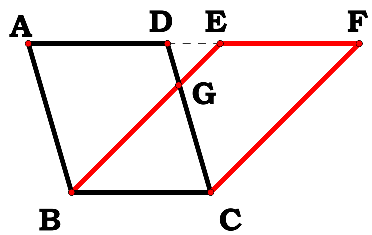
You have said next that the diameter also bisects the areas.

For, since *AB* is equal to *CD* and *BC* is common, the two sides *AB*, *BC*, are equal to the two sides *DC*, *CB*, respectively; and the angle *ABC* is equal to the angle *BCD*; therefore, the base *AC* is also equal to *DB*, and the triangle *ABC* is equal to the triangle *DCB*.

Therefore, the diameter *BC* bisects the parallelogram *ACDB*, which was to be demonstrated.

Proposition 35. Parallelograms on Same Base

Parallelograms constructed on the same base and in the same parallels are equal to one another.



Construct *ABCD*, *EBCF* as parallelograms on the same base *BC* and in the same parallels *AF*, *BC*.

You have said that *ABCD* is equal to the parallelogram *EBCF*.

For, since *ABCD* is a parallelogram, *AD* is equal to *BC*.

For the same reason also *EF* is equal to *BC* so that *AD* is also equal to *EF* and *DE* is common; therefore, the whole *AE* is equal to the whole *DF*.

But *AB* is also equal to *DC*; therefore, the two sides *EA*, *AB*, are equal to the two sides *FD*, *DC* respectively and the angle *FDC* is equal to the angle *EAB* the exterior to the interior; therefore, the base *EB* is equal to the base *FC* and the triangle *EAB* will be equal to the triangle *FDC*.

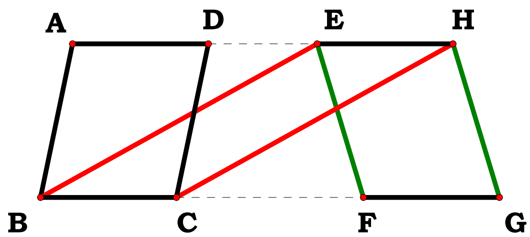
Subtract *DGE* from each; therefore, the trapezium *ABGD* which remains is equal to the trapezium *EGCF* which remains.

Add the triangle *GBC* to each; therefore, the whole parallelogram *ABCD* is equal to the whole parallelogram *EBCF*.

Therefore etc., which was to be demonstrated.

Proposition 36. Parallelograms on Equal Bases

Parallelograms constructed on equal bases and in the same parallels are equal to one another.



Construct *ABCD*, *EFGH* as parallelograms which are on equal bases *BC*, *FG* and in the same parallels *AH*, *BG*;

You have said that the parallelogram *ABCD* is equal to *EFGH*.

Describe *BE* and *CH*.

Then, since *BC* is equal to *FG*, while *FG* is equal to *EH*, *BC* is also equal to *EH*.

But, they are also parallel and *EB*, *HC*, intersect them; but, straight lines joining equal and parallel straight lines (at the extremities which are) in the same directions (respectively) are equal and parallel.

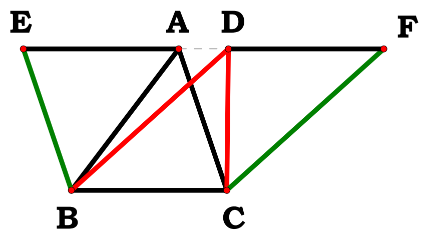
Therefore *EBCH* is a parallelogram and it is equal to *ABCD* for it has the same base *BC* and is in the same parallels *BC*, *AH*.

For the same reason also *EFGH* is equal to the same *EBCH* so that the parallelogram *ABCD* is also equal to *EFGH*.

Therefore etc., which was to be demonstrated.

Proposition 37. Triangles Same Base Same Parallels

Triangles constructed on the same base and in the same parallels are equal, to one another.



Construct *ABC*, *DBC* as triangles on the same base *BC* and in the same parallels *AD*, *BC*;

You have said that the triangle *ABC* is equal to the triangle *DBC*.

Construct *AD* as produced in both directions to *E*, *F*; construct through *B*, *BE* as drawn parallel to *CA*, and let through *C*, *CF* be drawn parallel to *BD*.

Then each of the figures *EBCA*, *DBCF* is a parallelogram and they are equal for they are on the same base *BC* and in the same parallels *BC*, *EF*.

Moreover, the triangle ABC is half of the parallelogram EBCA; for the diameter *AB* bisects it.

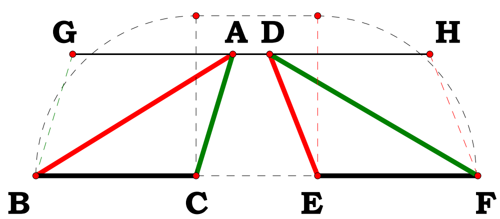
And the triangle *DBC* is half of the parallelogram *DBCF* for the diameter *DC* bisects it. The halves of equal things are equal, to one another.

Therefore, the triangle *ABC* is equal to the triangle *DBC*.

Therefore etc., which was to be demonstrated.

Proposition 38. Equal Triangles by Parallel

Triangles constructed on equal bases and in the same parallels are equal to one another.



Construct *ABC*, *DEF* as triangles on equal bases *BC*, *EF*, and in the same parallels *BF*, *AD*;

You have said that the triangle *ABC* is equal to the triangle *DEF*.

Produce *AD* be in both directions to *G*, *H*. Describe through *B*, *BG* as drawn parallel to *CA* and describe through *F*, *H* as drawn parallel to *DE*.

Then each of the figures *GBCA*, *DEFH* is a parallelogram and *GBCA* is equal to *DEFH* for they are on equal bases *BC*, *EF* and in the same parallels *BF*, *GH*.

Moreover, the triangle *ABC* is half of the parallelogram *GBCA* for the diameter *AB* bisects it.

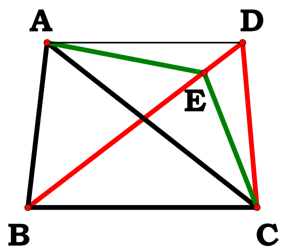
And the triangle *FED* is half of the parallelogram *DEFH* for the diameter *DF* bisects it. The halves of equal things are equal, to one another.

Therefore, the triangle *ABC* is equal to the triangle *DEF*.

Therefore etc., which was to be demonstrated.

Proposition 39. Equal Triangles on the Same Base

Equal triangles described on the same base and on the same side are also *in the same parallels*.



Construct *ABC*, *DBC* as equal triangles which are on the same base *BC* and on the same side of it;

You have said that they are also in the same parallels. Join *AD*.

You have said that *AD* is parallel to *BC*. If you deny it, describe *AE* as drawn through the point *A* parallel to *BC* and join *EC*.

Therefore, the triangle *ABC* is equal to the triangle *EBC* for it is on the same base *BC* with it and in the same parallels.

But *ABC* is equal to *DBC*; therefore *DBC* is also equal to *EBC*, the greater to the less, which is impossible.

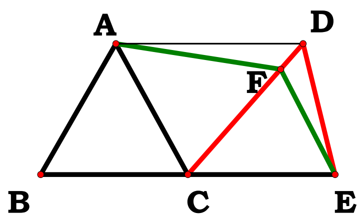
Therefore, *AE* is not parallel to *BC*.

Similarly, it can be proven that neither is any other straight line except *AD*; therefore *AD* is parallel to *BC*.

Therefore etc., which was to be demonstrated.

Proposition 40. Duplicate Proposition 39

Equal triangles constructed on equal bases and on the same side are also *in the same parallels*.



Construct *ABC*, *CDE* as equal triangles on equal bases *BC*, *CE* and on the same side.

You have then said that they are also in the same parallels. Join *AD*.

You have then said that *AD* is parallel to *BE*.

If you deny it, draw *AF* through *A* parallel to *BE* and join *FE*.

Therefore, the triangle *ABC* is equal to the triangle *FCE* for they are on equal bases *BC*, *CE* and in the same parallels *BE*, *AF*.

But the triangle *ABC* is equal to the triangle *DCE*; therefore, the triangle *DCE* is also equal to the triangle *FCE*, the greater to the less which is impossible.

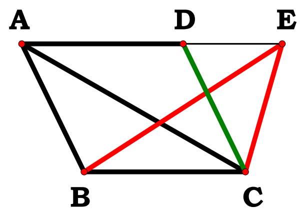
Therefore, *AF* is not parallel to *BE*.

Similarly, it can be proven that neither is any other straight line except *AD*; therefore, *AD* is parallel to *BE*.

Therefore etc., which was to be demonstrated.

Proposition 41. Triangle as Half a Parallelgram

If a parallelogram have the same base with a triangle and is in the same parallels, the parallelogram is double of the triangle.



Construct the parallelogram *ABCD* having the same base *BC* with the triangle *EBC* and let it be in the same parallels *BC*, *AE*.

You have then said that the parallelogram *ABCD* is double of the triangle *BEC*.

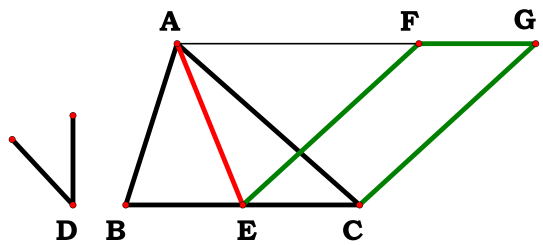
Join *AC*. Then, the triangle *ABC* is equal to the triangle *EBC*; for it is on the same base *BC* with it and in the same parallels *BC*, *AE*.

But the parallelogram *ABCD* is double of the triangle *ABC* for the diameter *AC* bisects it so that the parallelogram *ABCD* is also double of the triangle, *EBC*.

Therefore etc., which was to be demonstrated.

Proposition 42. Construct In Angle Parallelogram Equal to Triangle

To construct in a particular angle a parallelogram equal to a given triangle.



Construct the triangle *ABC*, and *D* as the angle; thus it is required, to construct in the angle *D*, a parallelogram equal, to the triangle *ABC*.

Bisect *BC* at *E* and join *AE*. On the segment *EC* and at the point *E* on it, construct the angle *CEF* as equal to the angle *D*.

Construct through *A*, *AG* drawn parallel to *EC* and through *C*, *CG* drawn parallel to *EF*.

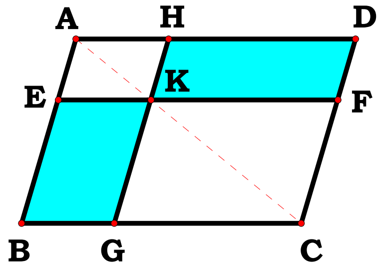
Then *FECG* is a parallelogram. And, since *BE* is equal to *EC*, the triangle *ABE* is also equal to the triangle *AEC* for they are on equal bases *BE*, *EC* and in the same parallels *BC*, *AG*; therefore the triangle *ABC* is double of the triangle *AEC*.

But, the parallelogram *FECG* is also double of the triangle *AEC* for it has the same base with it and is in the same parallels with it; therefore, the parallelogram *FECG* is equal to the triangle *ABC* and it has the angle *CEF* equal to the given angle *D*.

Therefore, the parallelogram *FECG* has been constructed equal to the given triangle *ABC* in the angle *CEF* which is equal to *D* which was to be done.

Proposition 43. Equal Complements of a Parallelogram

In any parallelogram the complements of the parallelograms about the diameter are equal, to one another.



Construct *ABCD* as a parallelogram and *AC* as its diameter; and about *AC*, construct *EH*, *FG* as parallelograms and *BK*, *KD* as the so-called complements.

You have said that the complement *BK* is equal to the complement *KD*.

For, since *ABCD* is a parallelogram and *AC* its diameter the triangle *ABC* is equal to the triangle *ACD*.

Again, since *EH* is a parallelogram and *AK* is its diameter the triangle *AEK* is equal to the triangle *AHK*.

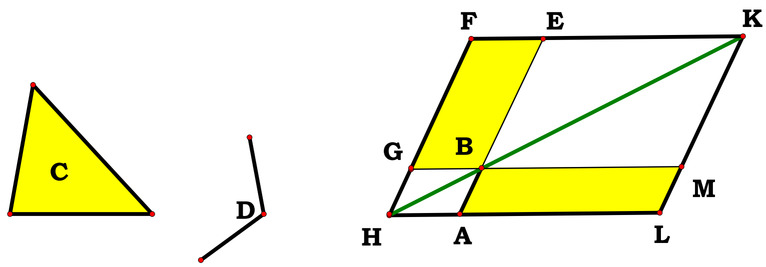
For the same reason, the triangle *KFC* is also equal to *KGC*.

Now, since the triangle *AEK* is equal to the triangle *AHK* and *KFC* to *KGC* the triangle *AEK* together with *KGC* is equal to the triangle *AHK* together with *KFC* and the whole triangle *ABC* is also equal to the whole *ADC* therefore the complement *BK* which remains is equal to the complement *KD* which remains.

Therefore etc., which was to be demonstrated.

Proposition 44. Construct on a Line, Angle, a Parallelogram Equal to a Triangle

Construct on a line in a given rectilineal angle a parallelogram equal to a given triangle.



Construct *AB* as the line, *C* as the triangle and *D* the angle; thus it is required, to apply to the line *AB* in an angle equal to the angle *D* a parallelogram equal to the given triangle *C*.

Construct the parallelogram *BEFG* as equal to the triangle *C* in the angle *EBG* which is equal to *D*. Construct it so that *BE* is inline with *AB*;

Draw *FG* through to *H* and construct *AH* as drawn through *A* parallel to either *BG* or *EF*. Join *HB*.

Then, since the line *HF* intersects the parallels *AH*, *EF* the angles *AHF*, *HFE* are equal to two right angles.

Therefore, the angles *BHG*, *GFE* are less than two right angles; and segments produced indefinitely from angles less than two right angles meet; therefore *HB*, *FE* when produced will meet.

Produce them to meet at *K*. Draw from the point *K*, *KL* parallel to either *EA* or *FH* and produce *HA* and *GB* to the points *L* and *M*.

Then *HLKF* is a parallelogram *HK* is its diameter and *AG*, *ME* are parallelograms and *LB*, *BF* the so-called complements about *HK*; therefore, *LB* is equal to *BF*.

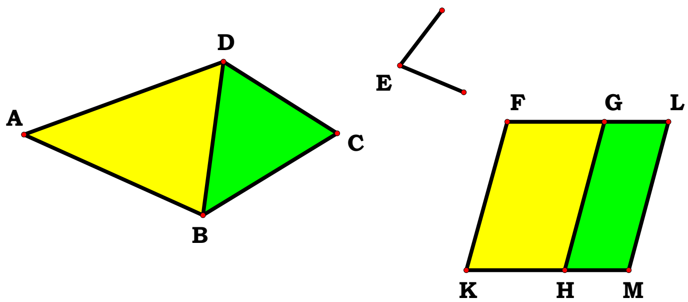
But *BF* is equal to the triangle *C*; therefore *LB* is also equal to *C*.

And, since the angle *GBE* is equal to the angle *ABM*, while the angle *GBE* is equal to *D*, the angle *ABM* is also equal to the angle *D*.

Therefore, the parallelogram *LB* equal to the given triangle *C* has been applied to the given straight line *AB* in the angle *ABM* which is equal to *D*, which was to be done.

Proposition 45. Construct a Parallelogram with Givnens

To construct in a given rectilineal angle a parallelogram equal to a given rectilineal figure.



Construct *ABCD* as the given rectilineal figure and *E* as the given rectilineal angle; thus it is required to construct in the given angle *E* a parallelogram equal to the rectilineal figure *ABCD*.

Join *DB* and construct the parallelogram *FH* equal to the triangle *ABD* in the angle *HKF* which is equal to *E*.

Construct the parallelogram *GM* equal to the triangle *DBC* as applied to the segment *GH* in the angle *GHM* which is equal to *E*.

Then, since the angle *E* is equal to each of the angles *HKF*, *GHM* the angle *HKF* is also equal to the angle *GHM*.

Construct the angle *KHG* as added to each; therefore, the angles *FKH*, *KHG* are equal to the angles *KHG*, *GHM*.

But, the angles *FKH*, *KHG* are equal to two right angles; therefore, the angles *KHG*, *GHM* are also equal to two right angles.

Thus, with a segment *GH* and at the point *H* on it the two segments *KH*, *HM*, not lying on the same side, make the adjacent angles equal to two right angles; therefore *KH* is inline with *HM*.

And, since the segment *HG*, intersects the parallels *KM*, *FG* the alternate angles *MHG*, *HGF* are equal to one another.

Add the angle *HGL* to each; therefore, the angles *MHG*, *HGL* are equal to the angles *HGF*, *HGL*.

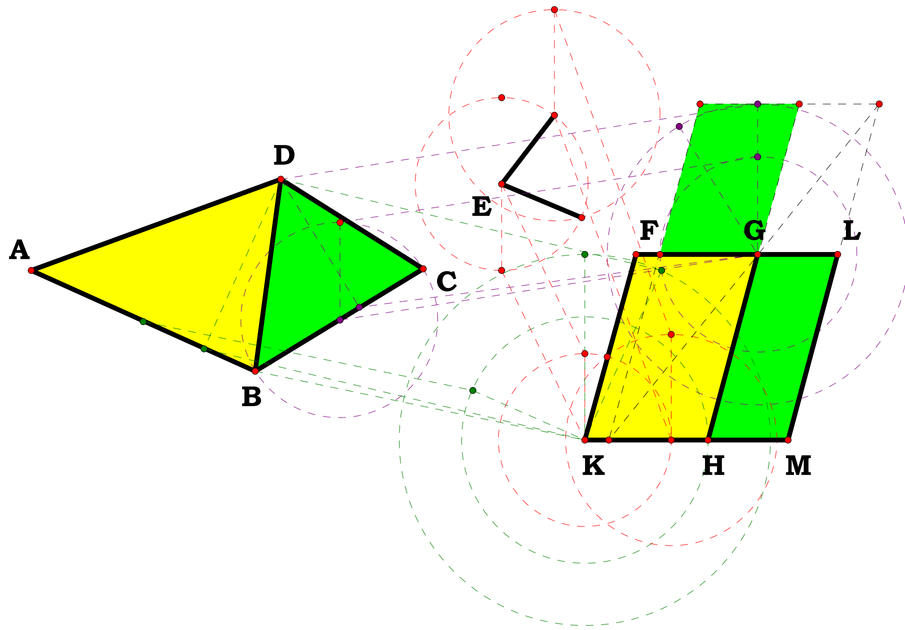
But the angles *MHG*, *HGL* are equal to two right angles; therefore, the angles *HGF*, *HGL* are also equal to two right angles.

Therefore, *FG* is inline with *GL*.

And, since *FK* is equal and parallel to *HG*, and *HG* to *ML*, also *KF* is equal and parallel to *ML*; and the segments *KM*, *FL* join them, therefore, *KM*, *FL* are also equal and parallel.

Therefore, *KFLM* is a parallelogram.

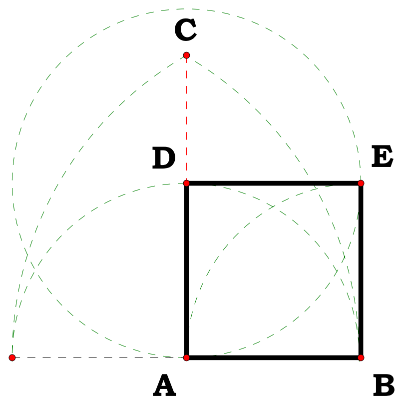
And, since the triangle *ABD* is equal to the parallelogram *FH*, and *DBC* to *GM*, the whole rectilineal figure *ABCD* is equal to the whole parallelogram *KFLM*.



Therefore, the parallelogram *KFLM* has been constructed equal to the given rectilineal figure *ABCD* in the angle *FKM* which is equal to the given angle *E*, which was to be done.

Proposition 46. Construct a Square

With a segment to describe a square.



Construct any segment *AB*; thus it is required to describe a square with the segment *AB*.

Construct the line *AC* at right angles to the segment *AB*. From point *A* make *AD* equal to *AB*.

Through the point *D* draw *DE* parallel to *AB*.

Through the point *B* draw *BE* parallel to *AD*.

Therefore *ADEB* is a parallelogram; therefore *AB* is equal to *DE* and *AD* to *BE*.

But, *AB* is equal to *AD* therefore the four segments *BA*, *AD*, *DE*, *EB* are equal, to one another; therefore, the parallelogram *ADEB*, is equilateral.

You have said that it is also right-angled.

For, since the segment *AD* intersects the parallels *AB*, *DE* the angles *BAD*, *ADE* are equal to two right angles.

But the angle *BAD* is right therefore the angle *ADE* is also right.

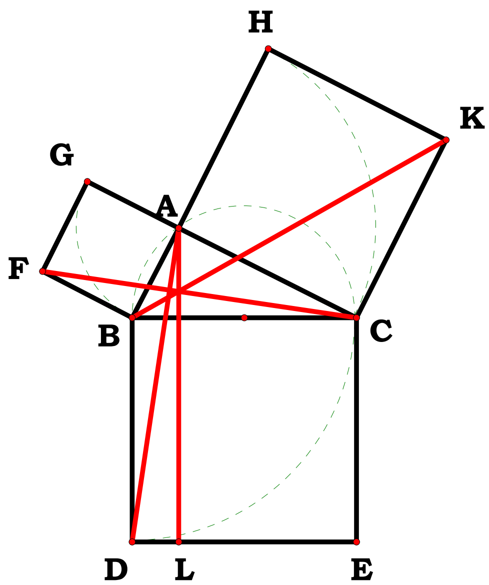
And in parallelogrammic areas the opposite sides and angles are equal to one another; therefore each of the opposite angles *ABE*, *BED* is also right.

Therefore *ADEB* is right-angled. And it was also proved equilateral.

Therefore it is a square and it is described on the segment *AB*, which was to be done.

Proposition 47. $A^2 + B^2 = C^2$

In right-angled triangles the square on the side subtending the right angle is equal to the squares on the sides containing the right angle.



Construct *ABC* as a right-angled triangle having the angle *BAC* right.

You have said that the square on *BC* is equal to the squares on *BA*, *AC*.

Construct on *BC* the square *BDEC* and on *BA*, *AC* the squares *GB*, *HC*; Construct *A* to *L* as parallel to either *BD* or *CE* and join *AD*, *FC*.

Then, since each of the angles *BAC*, *BAG* is right it follows that with a straight line *BA*, and at the point *A* on it, the two segments *AC*, *AG*, not lying on the same side, make the adjacent angles equal to two right angles; therefore *CA* is collinear with *AG*.

For the same reason *BA* is also collinear with *AH*.

And since the angle *DBC* is equal to the angle *FBA* for each is right; add angle *ABC* to each; therefore the whole angle *DBA* is equal to the whole angle *FBC* and since *DB* is equal to *BC* and *FB* to *BA*, therefore the two sides *AB*, *BD* are equal to the two sides *FB*, *BC* respectively, and the angle *ABD* is equal to the angle *FBC*; therefore the base *AD* is equal to the base *FC* and the triangle *ABD* is equal to the triangle *FBC*.

Now the parallelogram *BL* is double of the triangle *ABD* for they have the same base *BD* and are in the same parallels *BD*, *AL*.

And the square *GB* is double of the triangle *FBC* for they again have the same base *FB* and are in the same parallels *FB*, *GC* therefore the parallelogram *BL* is also equal to the square *GB*.

Similarly, if *AE BK* be described the parallelogram *CL* can also be proved equal to the square *HC*; therefore, the whole square *BDEC* is equal to the two squares *GB*, *HC*. And the square *BDEC* is described on *BC* and the squares *GB*, *HC* on *BA*, *AC*.

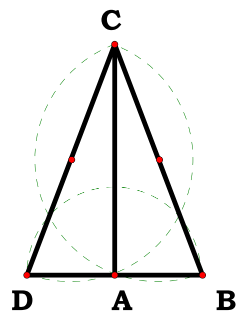
Therefore, the square on the side *BC* is equal to the squares on the sides *BA*, *AC*.

Therefore etc., which was to be demonstrated.

Proposition 48. The relationship between Three Sides of a Triangle

If one understood this proposition, they would have realized the this book starts with a triangle based on arithmetic progression and ends with a geometric progression which solves for all triangles. I will follow it up with a more modern approach, but the result is going to be the same, every triangle, by what has been given, can be configured as an equilateral triangle, and an equilateral triangle as two right triangles. The result will be the squares on any two sides of a triangle is equal to twice the square on the medial bisector and half the square on the remaining side.

If in a triangle the square on one of the sides is equal to the squares on the remaining two sides of the triangle then *the angle contained by the remaining two sides of the triangle is right*.



Construct the triangle *ABC* with the square on one side *BC* as equal to the squares on the sides *BA*, *AC*;

You have said that the angle *BAC* is right.

Draw *AD* from the point *A* at right angles to the line *AC*.

Construct *AD* equal to *BA* and join *DC*.

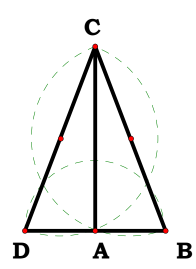
Since, *DA* is equal to *AB* the square on *DA* is also equal to the square on *AB*.

Let, the square on *AC* be added to each; therefore the squares on *DA*, *AC* are equal to the squares on *BA*, *AC*.

But, the square on *DC*, is equal to the squares on *DA*, *AC*, for, the angle, *DAC*, is right; and the square, on *BC*, is equal, to the squares, on *BA*, *AC*, for this is the hypothesis; therefore, the square on *DC* is equal to the square on *BC*, so that the side *DC* is also equal to *BC*.

And, since *DA* is equal to *AB*, and *AC* is common, the two sides *DA*, *AC* are equal to the two sides *BA*, *AC*; and the base *DC* is equal to the base *BC*; therefore, the angle *DAC* is equal to the angle *BAC* But, the angle *DAC* is right; therefore, the angle *BAC* is also, right.

Therefore etc., which was to be demonstrated.



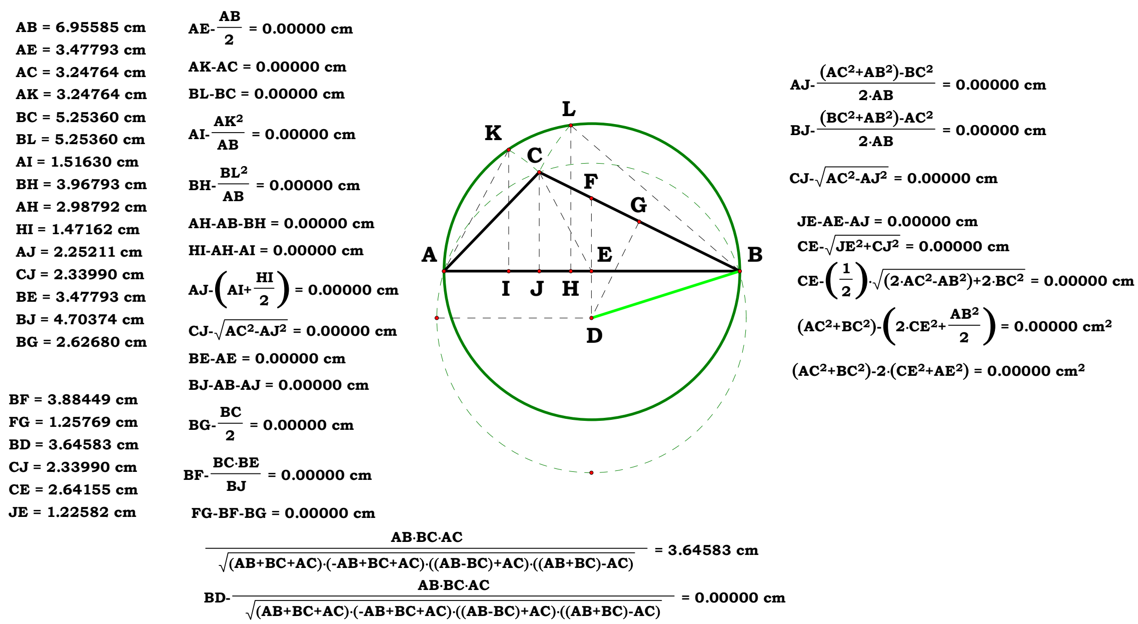
CD = 3.26276 cm
CB = 3.26276 cm
AD = 1.16417 cm
AC = 3.04800 cm
$(CD^2+CB^2)-(2 \cdot AD^2+2 \cdot AC^2) = 0.00000\ cm^2$

In short, this proposition is saying, the squares on any two sides of a triangle are equal to half the square on the remaining side plus twice the square on the medial bisector. Therefore, Proposition 49 will be done in a style more modern.

Proposition 49 Equation for the Three Sides of Any Triangle

Part of how some ancient scholars taught was for the purpose of determining a student's comprehension. Plato was a good example of that and so were the authors of the Bible. In short, this book seems to follow the practice common to the day, and also common to the Pythagorean System, don't give away the home planet (Babylon 5). In short, every trade kept certain key secrets.

But what I have learnt from my studies is that you cannot change the intellectual ability of anyone by words or recommendations, people always express exactly their abilities all the time. Therefore, I will present this proposition very much as I presented it in the Delian Quest a long time ago before I ordered and started my study of the *Elements* as translated by Heath, written in a child's or students drawing program.



Here again, as in proposition 48, we have the squares on any two sides of any triangle are equal to half the square of the remaining side added to twice the square on the medial bisector. Any mathematician, with the least bit of competence, should have figured out that so called Trigonometry was made obsolete by the *Elements* of Euclid almost two thousand and five hundred years ago.

How is it that so many mathematicians and scientist can tell you that they are able to comprehend and tell you all about the Universe, when the do not know what their own hand does with a pencil?

$$AC^2 + BC^2 = 2CE^2 + \frac{AB^2}{2}. \text{ or } AC^2 + BC^2 = 2(CE^2 + AE^2)$$

What does one call all of the gibberish of Trigonometry?